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ABSTRACT

The document reports the methodology, processes, findings, and conclusions of a study relating individual capabilities of handicapped persons to job requirements. The three major objectives of the study are analyzed: development of procedures to identify patterns of human attributes required for job performance: identification of the potential development of work relevant human attributes for handicapped persons: and application of the procedures in three occupations (general secretary, automotive mechanic, and business data programmer) to assess the use of this type of procedure for handicapped persons. The manual covers the following topics: guidelines and analysis for identifying key job activities, guidelines and analysis for identifying key attributes, sample instruments, analysis of the three occupations, simulations of procedures used in the three occupations, profiles of key tasks by key attributes, profiles of the attributes of the handicapped population, and resources for developing attribute profiles. (CL)

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Procedures Manual

RELATING THE CAPABILITIES OF THE HANDICAPPED TO THE HUMAN ATTRIBUTE REQUIREMENTS OF JOBS

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FOREWORD

Maximizing career opportunities and job satisfaction of handicapped persons involves a careful linkage of career preparation, counseling, and job placement. Although research and development efforts have made strides toward identifying, describing, and assessing individual handicaps and capabilities, there has been a research void in the development of ways to identify and describe relevant behavioral requirements of jobs for the handicapped and to relate their requirements to the capabilities, preparation, and employment of handicapped persons.

One effort undertaken to alleviate the discrepancy between the lack of knowledge on the part of educational personnel and employers about human characteristics or attributes required for performance on specific jobs and the capabilities of the handicapped person is this Procedures Manual. Its intent is to present a tested methodology that can be used with any type of occupation, with job activities within the occupation, and with any type of handicapped condition to establish profiles of the attributes actually required by those occupations and by matching those attributes to those demonstrated by the handicapped, counselors, educators and others working with the job placement needs of handicapped people. 26

25 This manual represents a report and final product of a twenty-seven month project effort, including tested procedures for identifying, describing, and illustrating the capabilities

of the handicapped, including all categories, to demonstrate the human attribute requirements of jobs. The Manual includes procedures for the use of sample instruments, illustrations and examples from three diverse occupations and guidelines for (1) generating task lists for jobs, (2) selecting work relevant attributes, (3) identifying appropriate survey respondents, (4) designing surveys, (5) analyzing and interpreting job information, and (6) constructing attribute requirements for jobs and attribute development profiles for handicapped persons.

Published separately, but augmenting this research, is a User's Guide. Though prepared independently, the purpose of the User's Guide is to identify, describe, and illustrate the capabilities of the handicapped to demonstrate the human attribute requirements of jobs.

The National Center expresses its deep appreciation and special gratitude to the project's panel of consultants whose expert advice and guidance were used throughout the project. Members of the project's advisory panel included: Dr. Nathan E. Acree, Rehabilitation Services Administration, Department of Health, Education and Welfare, Washington, D. C.; Dr. Patricia Cegelka of the Special Education Department, University of Kentucky, Lexington, Kentucky; Mrs. Charlotte Conaway, State Department of Education, Baltimore, Maryland; and Dr. Stanley Cramer, State University of New York, Buffalo, New York. Special appreciation is also extended to Dr. Leon Koyl, York Central Hospital, Ontario, Canada; and Dr. J. W. Cunningham, North Carolina State University for their help and contribution to the project.

Invaluable assistance and advice in the preparation of this manual were provided by Dr. Melville Appell, Bureau of Education for the Handicapped, U.S. Office of Education, Department of Health, Education and Welfare who served as project officer for the project. This manual was prepared by Dr. Marion T. Johnson, Project Director. Other contributing staff members of the project included Drs. Lorella McKinney, Dessie Page, and Elene S. Demos; Research Specialists; Drew Denton and Carole M. Johnson; Graduate Research Associates; and Dallas G. Ator, Associate Director of the Special Projects Division of the National Center.

Robert E. Taylor
Executive Director
The National Center for Research
in Vocational Education

PREFACE

This is a Procedures Manual containing the methodology, processes, findings, and conclusions of a twenty-seven (27) month study entitled "Relating the Capabilities of the Handicapped to the Human Attribute Requirements of Jobs". This manual, together with the separately bound Appendices, make up the primary product and final report for the project.

This manual was developed by the National Center for Research in Vocational Education, Special Projects Division, pursuant to a grant from the U. S. Office of Education, Bureau of Education for the Handicapped to illustrate procedures and methodology to be used when relating the capabilities of the handicapped to the human attribute requirements of jobs. For purposes of this research only three occupations were used. Their selection was predicated on the availability of task inventories developed previously at the National Center for Research in Vocational Education. The three occupations used represented three diverse fields and included survey respondents from three occupations --general secretary, automotive mechanic, and business data programmer--.

A number of organizations have contributed to the field testing of data contained in this guide relative to the occupations surveyed. Special appreciation is extended to those organizations across the contry who participated in this research representing the occupations. Additionally, special recognition is extended to those organizations representing the nine areas of handicapping conditions as defined by the U. S. Office of Education, Bureau of Education for the Handicapped who participated in the simulation phase of this research. All of these organizations are located in Columbus, Ohio and include the followin: Columbus School for the Blind, Bureau of Services for the Blind, Ohio School for the Deaf, Rehabilitation Services of Central Ohio, ARCraft West, St. Anthony's Hospital, Department of Speech Pathology, United Cerebral Palsy of Columbus and Franklin County, and Sixpence School.

INTRODUCTION

Purpose and Design of Manual

The primary purpose of this manual is to serve as a research reference to persons concerned with identifying, describing, and assessing the individual capabilities of handicapped persons and relating these capabilities to requirements of jobs. This manual has been designed for self-instructional use. It enables the user to better understand the *process* of developing work relevant human attributes required for job performance and relating these requirements to the capabilities of handicapped persons.

The content and format of the manual have been designed to accommodate many different levels of understanding of the different needs for information on the part of educational research personnel about human characteristics or attributes required for performance on specific jobs and the capabilities of handicapped persons to perform the job. The content of the manual includes sample instrumentations, illustrations, examples, and analyses from three diverse occupations, and guidelines for (1) generating task lists of jobs; (2) selecting work relevant attributes; (3) identifying appropriate survey respondents; (4) designing local and national surveys; (5) analyzing and interpreting job information; (6) constructing attribute requirements profiles for jobs; and (7) constructing attribute development profiles for handicapped persons. The design of the manual has been developed to include all procedures necessary to replicate this research.

Audiences and Development of Manual

This manual is directed at several primary research audiences and includes but is not limited to:

- *special educators*
- *teacher educators*
- *special educators/rehabilitation*
- *rehabilitation counselors*
- *vocational evaluators*
- *vocational educators*
- *vocational counselors*
- *rehabilitation specialists*
- *teachers, secondary*
- *job placement specialists*
- *employers*

Research and development procedures utilized in this study evolved from consideration of three major objectives. They are as follows:

(a) *Development of procedures to identify and portray the patterns of human attributes required for job performance*

(b) *Identification of the potential development of work relevant human attributes for handicapped persons*

(c) *Application of the procedures in three diverse occupations to assess the use and relative merit of this type of procedure for the handicapped*

The first objective, development of procedures for identification of the human attributes required for job performance by workers, resulted in a set of procedures for use by agencies and personnel serving the need for guidance, placement, and instruction of the handicapped. Human attribute profiles for each of the key job activities of the occupations selected for study were produced through application of the procedures.

The second objective, identification of the potential development of work relevant human attributes for handicapped persons, was intended to yield estimates of the potential level of development of the handicapped which might provide benchmark information useful in individual counseling for career preparation and potential employment of the handicapped.

The third objective, application and assessment of the procedures, provided initial estimates of the relative merits and usefulness of the work attribute information for educational and employment decision making through use of simulation techniques and activities.

Topics Covered

The overall purpose of this manual is to serve as a resource reference to persons concerned with researching the guidance and placement needs of the handicapped. The manual covers the following topics:

- *Guidelines and analysis for identifying key job activities*
- *Guidelines and analysis for identifying key attributes*
- *Sample instrumentation*
- *Illustration and analysis of three diverse occupations (Automotive Mechanic, General Secretary and Business Data Programmer)*
- *Simulations of the procedures used in the three occupations*
- *profiles of key task by key attributes across the state occupations*

- *Profiles of the attributes of the handicapped person used in the procedures*

- *Sources of information useful in developing attribute profiles for use by personnel working with the handicapped*

The manual includes four sections covering these topics, in addition to the introductory material. Each section contains extensive information relative to the procedures undertaken in this project. Each chapter is self-contained, which allows for concentration on the particular chapter most relevant to the user's needs.

Chapter I, *Pilot Test Information and Procedures*, is intended to provide a frame of reference and recommendation process for identification of job activities and attributes as well as identification of local respondents across the three occupations.

Chapter II, *Field Test Information and Procedures* contains the final analysis of the key tasks and key attributes identified in the pilot test. This chapter also contains the analysis of the methodologies used in (a) preparing comprehensive Dictionary of Occupational Titles statements, (b) identifying and surveying national respondents representative of the three occupations, and (c) analyzing the results of the field test data.

Chapter III, *Handicapped-by-Attribute Profile Development* contains the classification of the areas of exceptionality used in this research, data from persons experienced in working with the handicapped, results and analysis of the simulations.

Finally, Chapter IV, *Profile Construction*, provides information concerning the method used in relating the capabilities of the handicapped to the human attribute requirements of jobs. This chapter also contains recommendations for researchers to identify ways of profiling handicapped individuals.

Limitations of the Manual

This manual does not provide a succinct model for replication of the procedures, but rather provides an extensive itemization and analysis of all procedures used in this research. As such, the narrative may appear redundant, so it must be read with this point in mind. For a capsulated procedure, researchers should refer to the *User's Guide*.

This manual, additionally, contains only one approach to relating the capabilities of the handicapped to the human attribute requirements of jobs and provides profile analyses for only three occupations. The identification of key attributes may not be acceptable to all manual users, but these attributes have been subjected to empirical assessment and found to be the "most acceptable."

The *Procedure's Manual* cannot be viewed as a panacea for the myriad of problems faced by the handicapped and personnel working with the handicapped toward job procurement. Rather it provides a method for expediting this process.

Finally, the analyses of the profiles for the handicapped population is limited by the extremely small sample size. However, the purpose of the profiling procedure was to "validate a process," not to define limits of the handicapped individual. Therefore, a small sample size in this context is acceptable.

The procedure at this stage cannot be considered final. Efforts will be exerted to include other methodologies and profiling techniques that could be considered applicable for the handicapped.

CHAPTER I

PILOT TEST

Job Activity Identification Process

The first procedure was undertaken to develop a methodology for identifying relevant job activities. The procedure undertaken to accomplish this objective involved a three phase process. Phase I involved utilizing work developed by Ammerman and Pratzner. Phase II involved utilizing references from the Dictionary of Occupation Titles, and Phase III involved utilizing a task inventory data derived from Borcher et al.

Phase I. Phase I involved consulting existing task inventories developed by Ammerman and Pratzner and delimiting job tasks from them. The task inventory methodology utilized by Ammerman and Pratzner produced a listing of 297 tasks from an original listing of 492 tasks associated with the occupation of general secretary; 313 tasks from an original listing of 494 tasks associated with the occupation of business data programmer; 321 tasks from an original listing of 380 tasks associated with the occupation of automotive mechanic. These task listings were viewed as unwieldy for the purposes of this project and for those who would use the project's products.

In order to delimit listings from the Ammerman and Pratzner job tasks, the key tasks from their work were identified according to the following steps.

Step I

a. List those tasks rated 3.5 or higher (considered to be a significant part of the job by the worker). (3.5 is the median ranking on a 0-7 scale.) (See Appendix A, column a)

b. List the percentage of workers rating those tasks as 3.5 or greater in significance. (See Appendix A, column b)

c. For each task identified in (1a) above, list those with a rank of 1.5 or higher from the worker and supervisor ratings of importance to the job. (See Appendix A, column c)

Step II

a. List the tasks identified in Step I (a-c) as those needed within three months of employment by 50 percent or more of the supervisors. (See Appendix A)

b. List the 20-30 tasks with the highest ratings from the list compiled in Step II using worker significant ratings (e.g. - 4.9). [illegible]e Appendix A)

Appendix A contains the data analysis for the occupation of general secretary, automotive mechanic, and business data programmer derived from the Ammerman and Pratzner research. Appendix B contains the key tasks identified through this process.

Although the information resulting from the above process was viewed as significant in terms of key task identification, it was felt that the level of task specificity was too narrow to be valuable to counselors and placement officers. In other words, the tasks were too specific to be representative of the occupation as a whole. The danger that some persons might be "counseled out" of an occupation on the basis of their inability to perform one or more of the key tasks was of primary concern to the project staff. In addition, the question of availability and cost factors associated with similar task inventories for occupations other than those selected for use in this project arose. Therefore, there was a need to identify a new source for aggregated job tasks. The Dictionary of Occupational Titles was the second source consulted for occupational job activity descriptions.

Phase II. Phase II involved consulting the Dictionary of Occupational Titles (DOT). The second alternative source was consulted because of its aggregated nature and ready availability to most counselors and placement officers. Since the DOT is compiled in paragraphic form, the major job activities were extracted and edited to conform to task inventory sentence structure. Appendix C contains a listing of the DOT job activity statement for each of the three occupations.

Once the DOT job activities were enumerated, this listing was compared to that derived during the key task identification process in Phase I using the Ammerman and Pratzner study. Each key task identified from the Ammerman study was compared to its broader DOT job activity counterpart and a determination was made as to whether the key task was defined in terms equal to, greater than, or less than the DOT referenced job activity statement. If the key task was greater than the job activity statement, the latter was broadened to include the key task. If the key task was less than or equal to the job activity, no change in the job activity statement was made. Results of this analysis for the occupation of general secretary, automotive mechanic, and business data programmer appear in Appendix A.

Phase III. Phase III of the job activity identification process was the utilization of task data derived by Borcher, et al. This phase was included as a further check of the aggregated nature of the composite job activity statements. The methodology employed by Borcher, et al. performed separate analyses of the data for the different hierarchical positions within each occupation. It was possible, therefore, to ascertain which tasks were typically performed by persons at the entry level of an occupation as well as those tasks performed by their supervisors.

Appendix E presents descriptions of job tasks for each of the three categories developed by Borcher et al. These were compared with those derived by the aggregation of the Ammerman and Pratzner and DOT revised job activity statements. The equal-to, greater-than, less-than approach was again utilized. Appendix F displays these data for each of the three occupations. Additions were made to each job activity statement if the task(s) identified by Borcher et al. were greater than the statement given in the aggregated DOT. No change was made if the task listed in Borcher et al. was equal to, or less than the aggregated DOT statement.

An example of the outcomes of the total aggregation process is displayed in Table I. The data illustrated are for occupation of general secretary. The complete data for each of the three occupations resulted in the final instrument used in the pilot test. The complete data appear in Appendix G.

TABLE 1

EXAMPLE OF THE AGGREGATION PROCESS FOR THE OCCUPATION OF GENERAL SECRETARY

A. DOT revised activity statement reads:

> "Takes dictation in shorthand or on stenotype machine."

B. Ammerman and Pratzner's statement describing the same activity reads:

> "Write shorthand (any system)" - (equal to revised DOT).*

C. Borcher's corresponding activities read:

> "Write shorthand (any system)" - (equal to revised DOT)
>
> "Write shorthand for more than - (greater than revised DOT) one person but only one at a time."
>
> "Take dictation over the telephone" - (greater than revised DOT).
>
> "Take dictation at the typewriter (type dictation as employer dictates)." (greater than revised DOT)

The final revised job activity statement was aggregated to read:

> "Take dictation in shorthand (any system)."

*NOTE: This activity statement by Ammerman and Pratzner is equal to the revised DOT statement. Additionally, under the Borcher et al. job activity description, four activities relate to the DOT and Ammerman/Pratzner activity descriptor.

Summary of Job Activity Identification Process

Once the revised job activity lists were aggregated by combining the DOT, Ammerman/Pratzner and Borcher et al. listings, a final check of the comprehensiveness of the revised listing was made. This checking process involved comparing the broad activity statements, identified by Ammerman/Pratzner and Borcher et al. and the tasks subsumed under each of them with the revised job activity statements for the three occupations. If, as a result of this comparison, a void was discovered in the revised job activity statement list(s), additional new job activity statements were added to the final listing. These new statements resulted from an overlay of the Ammerman/Pratzner listing with that of Borcher et al.

Once the aggregated job activity list was finalized, the job activity field review instrument was developed. A separate but similar instrument was designed for each of the three occupations.

Seven persons (internal and external to the National Center for Research in Vocational Education), experienced in each of the three occupations, were asked via the field review instruments, to rate each of the job activity statements according to a seven point scale similar to that used by Hemphill. These persons were also asked to critique: (1) each job activity statement in terms of correctness and appropriateness, (2) the rating scale in terms of clarity and appropriateness, and (3) the general design of the instrument. In addition, each respondent was to indicate any job activity statements which should be added to the list and to rate these additions according to the seven point scale. Appendix G contains copies of the instruments and their accompanying instructions for completion.

Once the internal field review data were collected, they were compiled and used to revise the job activity statements for each occupation. A job activity statement was deleted from the listing if it received a median ranking below 3.0 on the rating scale. The remaining job activity statements were then revised in accordance with the field reviewer's comments, if more than one reviewer suggested a similar alteration. Additions to the job activity statements were made according to the same criteria. Appendix H contains the results based on the field review of the job activity statements. The final compilation of the job activity statements remained virtually the same as those internally pilot tested. That is, based upon the ratings of the completeness of the job activity statements, no additions or deletions were made by the internal respondents. This product, then became the basis for the final job activity statements for each occupation used in the pilot test.

Job Activity-by-Occupation Instrument Development

Following the field review of the job activity statements, the development of the *Job Activity-by-Occupation Instrument* began. The *Job Activity-by-Occupation Instrument* developed was essentially the same as the job activity internal field review instrument. The instrument was designed to further validate the completeness of job activity statements by using practitioners in the field as respondents to determine if further revisions of the job activity statements were necessary. As shown in Appendix I, this instrument contained the listing of job activity statements: twenty-two for the occupation of general secretary; twenty-one for the occupation of automotive mechanic; and twenty for the occupation of business data programmer.

Key Attribute Identification Process

The second major procedure was undertaken to determine a method of identifying and quantifying human attributes or characteristics common and or attributable to individuals. This process included determining a way of describing human behavior in measurable terms. A thorough review of the literature was undertaken to find an available inventory which measured the following major categories:

a. *General Vocational Capabilities* defined as knowledges and skills which are relevant to a wide variety of occupations but which are more occupationally specific than basic aptitudes and academic abilities. General vocational capabilities can be thought of as falling on a hardware-to-people continuum divided into the following categories: Mechanical; Electrical; Spatial (including structures and layout and visualization); Chemical-Biological; Symbolic (including numerical operations and verbal communication); and people.

b. *Cognitive Abilities* defined as general and relatively stable intellectual capacities involving perceiving, recognizing, remembering, conceiving, reasoning, creative thinking, judging, etc. Cognitive abilities are prerequisite to performance on a wide variety of specific tasks. A distinguishing characteristic of cognitive abilities--in comparison to psychomotor abilities and affective states (such as needs and interests)--is a relatively high state of consciousness or awareness of one's behavior.

c. *Psychomotor Abilities* defined as capacities involving bodily or muscular movement, usually in coordination with the sensory processes.

d. *Sensory Capabilities* defined as capacities involving bodily or muscular movement, usually in coordination with the sensory processes.

e. *Interests*[a] defined as preferences for, attractions toward, or linkings of various classes of activities and the contexts associated with these activities. Interests are measured by questions concerning the examinee's preference for or strength of attraction to such things as job activities, hobbies, recreational pursuits, and leisure activities.

f. *Needs*[b] defined as preferences, desires, or felt wants for various classes of outcomes and conditions which, for the respondent, are associated with satisfaction or reward. Needs are usually measured by questions concerning the examinee's preference for or strength of attraction toward specified outcomes or conditions.

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[a] *The Interests definitions (items 63-86) were adapted from Ohio Vocational Interest Survey, copyright 1969 by Harcourt Brace Jovanich, Inc.*

[b] *The Needs definitions (items 87-103) were adapted from the Manual for the Minnesota Importance Questionnaire, copyright 1971 by the Work Adjustment Project, Industrial Relations Center, University of Minnesota.*

Identification of the key attributes associated with the key job activities within each of the three occupations, automotive mechanics, general secretaries, and business data programmers (specified during the job activity identification process discussed previously), is divided into three phases.

Phase I. During the first phase, definitions of the 103 human attributes identified by Neeb et al. were edited for sex stereotyping. Editing was based upon the work done by the United State Department of Labor to accompany the Dictionary of Occupational Titles. Once editing for stereotyping was complete, the 103 attribute definitions were compiled and bound to form one part of the *Occupation-by-Attribute* and *Job Activity-by-Attribute* rating instruments for each of the three occupations. Appendix J contains the edited 103 attribute definitions.

Phase II. The second phase of the process for identifying the key attributes from among the total of 103 involved the development of two rating instruments, i.e., *Occupation-by-Attribute Instrument* and *Job-Activity-by-Attribute Instrument.* The 103 attributes were listed by title on each rating instrument so that the rating sheet could be reduced to a manageable size. The definitions of attributes, edited in Phase I of this process, accompanied each rating instrument to provide respondents with the opportunity to refer to definitions and examples of attributes. The rating scale for each instrument is a seven point scale similar to that used in the job activity identification process.

Phase III. In phase three of the process for identifying the key attributes for each of three occupations and also for each of the key job activities, nine persons (supervisors and workers employed within each occupation), were asked to rate each of the 13 attributes regarding their need/importance on a seven point scale for successful performance in the occupation or the job activity. Appendix K contains a sample of the *Job Activity-by-Attribute Instrument* without the job activity statements. Instructions to the respondent accompanied each rating instrument. Similar instruments were used for each occupation.

The next section identifies the respondents sampled in this pilot test phase and discusses the results from the pilot test data.

Description of Respondents

The pilot test respondent data analysis provides a brief descriptive analysis of the sample surveyed in the pilot test. It includes an extensive breakdown for each occupation regarding type of position held within the occupation, type of business, average number of years employed within that position and where the training was received. This information is provided for both instruments used in the survey and is intended to be informational for purposes of selecting types of persons in replicating this procedure.

GENERAL SECRETARY

Occupation-by-Attribute Instrument - A total of nine persons were sampled in the *Occupation-by-Attribute Instrument*--five workers and four supervisors.

Present job positions were primarily in the general secretary and executive secretary category for workers and in the executive category for supervisors.

The types of businesses in which most respondents were employed fell in the categories of banking/finance, distribution (wholesale/retail), and insurance. This was true of both supervisors and workers.

The average number of years employed on the present job was 4.4 years for workers and 6.5 years for supervisors. The average number of years employed in the secretarial field was nine for workers and fourteen for supervisors. On the average, workers generally performed their secretarial duties for four persons and supervisors for one other person. On the average, workers worked with no other secretaries in performing their secretarial duties and supervisors worked with four persons in performing their duties.

Both workers and supervisors primarily received their secretarial training either in public secondary school or private business school. Additionally, both supervisors and workers indicated that on-the-job training and/or college or university experience provided training.

Occupation-by-Job Activity Instrument - A total of nine persons were sampled in the *Occupation-by-Job Activity Instrument:* five workers and four supervisors.

Present job positions were primarily in the general secretary category for workers and in administrative assistant category for supervisors.

Again, the type of business in which most respondents were employed fell in the categories of banking/finance and insurance for both supervisors and workers.

The average number of years employed on the present job was seven for workers and three for supervisors. The average number of years employed in the secretarial field was six for workers and thirteen for supervisors. On the average, workers generally performed their secretarial duties for three persons, and supervisors for an average of eighteen persons. Workers, on the average, worked with one other secretary in performing their secretarial duties and supervisors worked with two other persons in performing their duties.

Both workers and supervisors primarily received their secretarial training in either public secondary school or on the job.

Job Activity-by-Attribute Instrument - Seven persons were sampled in the *Job Activity-by-Attribute Instrument*, four workers and three supervisors.

Present job positions for workers were primarily in the administrative aide, personnel officer, and section officer categories. Job titles for supervisors included office manager and administrative aide.

The type of business in which most respondents were employed again fell in the range of either banking/finance or insurance for workers, and banking/finance for supervisors.

The average number of years employed on the present job was 4.7 years for workers and 7 years for supervisors. The average number of years employed in the secretarial field was 17.7 years for workers and 15 years for supervisors. Workers generally performed their secretarial duties for three persons and supervisors for 1,866, on the average.

Workers, on the average, worked with two other secretaries in performing their duties and supervisors worked with twenty-six other secretaries in performing their duties.

Workers generally received their training in the secretarial field from on-the-job experience and supervisors received their training in public vocational-technical schools.

Summary - Respondents across the three instruments were generally employed in the general secretarial, administrative aide/assistant, or executive secretary category. Most respondents were employed in the banking/finance and/or insurance settings. This was true for both supervisors and workers.

With respect to the *Occupation-by-Attribute Instrument*, respondents represented a total of forty-eight years of work experience, twenty-two years for workers and twenty-six years for supervisors; and had worked in the secretarial field for a total of 104 years, forty-five years for workers and fifty-nine years for supervisors. Respondents performed their tasks for a total of twenty-four persons--twenty persons for workers and four persons for supervisors--and worked with a total of eighteen other persons in performing their secretarial duties; one person for workers and seventeen persons for supervisors. For both supervisors and workers, training in the secretarial field was received either in public secondary school or private business school. Both supervisors and workers indicated that on-the-job training and college or university experience also provided training.

With respect to the *Occupation-by-Job Activity Instrument*, respondents represented a total of fifty-one years of work experience--thirty-eight years for workers and thirteen years for supervisors--and had worked in the secretarial field for a combined total of eighty-six years, thirty-two years for workers and fifty-four years for supervisors. Respondents generally performed their tasks for eighty-nine other persons--fifteen persons for workers and seventy-four persons for supervisors--and worked with a total of sixteen other persons in performing their secretarial duties. Workers worked with eight other persons in performing their duties and supervisors worked with eight other persons in performing their duties. For both supervisors and workers, training in the secretarial field was received in public secondary school and on the job.

With respect to the *Job Activity-by-Attribute Instrument*, respondents represented a total of forty years of work experience--nineteen years for workers and twenty-one years for supervisors. Respondents represented a total of 116 years of experience in the secretarial field--seventy-one years for workers and forty-five years for supervisors. Respondents generally performed their secretarial duties for a total of 5,612 workers--twelve persons for workers and 5,600 for supervisors. This extremely large number is due to the large number of personnel under the supervision of one individual in the sample. Workers and supervisors worked with a total of ninety other persons when performing their secretarial duties--ten persons for workers and eighty persons for supervisors. For both supervisors and workers, public vocational-technical school and on-the-job training provided secretarial training in the field.

BUSINESS DATA PROGRAMMER

Occupation-by-Attribute Instrument - A total number of nine persons were sampled in the *Occupation-by-Attribute Instrument:* five workers and four supervisors.

Present job positions for workers were primarily senior programmers and programmers, and job positions for supervisors included a wide range of job titles: project leader, manager of application system and programs, data system supervisor, and group leader (systems analyst).

The type of business in which most respondents were employed fell in the category of retirement system for workers, and the category of government for supervisors.

The average number of years that workers had worked on the job was 5.4 years and the average number of years for supervisors was 8 years. The average number of years employed in the data processing field was 10 for workers and 10.5 for supervisors.

Workers received their training primarily from: (1) on-the-job experience, (2) equipment manufacturing training program, (3) college or university, (4) private business school. Supervisors primarily received their training from (1) on-the-job experience, (2) military training school, (3) company in-plant training school, and (4) equipment manufacturing training program.

Occupation-by-Job Activity Instrument - A total number of nine persons were sampled in the *Occupation-by-Job Activity Instrument*, five workers and four supervisors.

Present job positions for workers were in the category of systems and procedure, and analysts, and in the category of management and data processing for supervisors.

The average number of years that workers were employed on the job was 1.4 years and the average for supervisors was 2.5 years. The average number of years that respondents were employed in the data processing field was 6.6 years for workers and 9.7 years for supervisors.

Workers received their training primarily from: (a) on-the-job training, (b) public vocational-technical schools, (c) colleges and universities. Supervisors received their training primarily from (a) on-the-job training and (b) equipment manufacturers' training program.

Job Activity-by-Attribute Instrument - A total number of seven persons were sampled in the *Job Activity-by-Attribute Instrument*, five workers and two supervisors.

Present job positions for workers were primarily systems and procedures analysts and programmers. Supervisors' job categories were in the area of assistant manager (systems programming) and systems programmer.

The type of business in which most respondents were employed was in the area of distribution, government, and retail business. This was true for both supervisors and workers.

The average number of years employed in the field of data processing was 4.8 years for workers and 14 years for supervisors.

Workers received their training primarily from: (1) on-the-job training and (2) college and universities. Supervisors received their training primarily on the job.

Summary - Respondents across the three instruments were generally employed in the fields of senior programmer and systems and procedure analyst. Most respondents were employed in government, retirement system, insurance, banking/finance, and distribution settings. This was true for both supervisors and workers.

With respect to the *Occupation-by-Attribute Instrument*, respondents represented a total of fifty-nine years of work experience--twenty-seven years for workers and thirty-two years for supervisors--and had worked in the business data programming field for a total of ninety-five years--fifty-three years for workers and forty-two years for supervisors. Respondents received their data programming experiences from the following sources: (a) on-the-job training, (b) military school, (c) company in-plant school, (d) equipment manufacturing training school, and (e) colleges and universities.

With respect to the *Occupation-by-Job Instrument*, respondents represented a total of seventeen years of work experience--seven years for workers and ten years for supervisors--and had worked in the business data programming field for a total of seventy-two years--thirty-three years for workers and thirty-nine years for supervisors. Respondents received their data programming experiences from the following sources: (a) on-the-job training, (b) equipment manufacturing training program, (c) public vocational-technical school and (d) college or university experience.

With respect to the *Job-Activity-by-Attribute Instrument*, respondents represented a total of twenty-one years of work experience--seven years for workers and fourteen years for supervisors and had worked in the business data programming field for a total of fifty-two years--twenty-four years for workers and twenty-eight years for supervisors. Respondents received their data programming experiences from the following sources: (a) on-the-job training, (b) equipment manufacturing training program, and (c) college or university experience.

AUTOMOTIVE MECHANIC

Occupation-by-Attribute Instrument - A total number of nine persons were sampled in the *Occupation-by-Attribute Instrument*, five workers and four supervisors.

Present job positions for workers were in the field of automotive mechanic category. For supervisors, job positions included a wide range of job titles: service advisor, service manager, and garage owner.

The type of business in which respondents were employed fell in the categories of new car dealer and independent garage.

The average number of years that workers had worked on the job was sixteen years, and the average number of years supervisors had worked on the job was sixteen years.

Workers received their experience from the following sources: on-the-job training and company training programs. Supervisors also responded that on-the-job training programs and company training programs were their source of training in the automotive mechanic field.

Occupation-by-Job Activity Instrument - A total number of nine persons were sampled in the *Occupation-by-Job Activity Instrument*, five workers and four supervisors.

Present job positions for workers were in the area of automotive mechanics. For supervisors, present positions included the following ranges of job titles: automotive mechanic and service manager.

The type of business in which respondents were employed was the new car dealership. This was true for both supervisors and workers.

The average number of years that workers had worked on the job was 14.8 years and supervisors had worked on the job for an average of 17 years.

Workers received their training in the field of automotive mechanics from the following sources: (a) on-the-job training, (b) private automotive mechanic school, and (c) company training program. Supervisors received their training from: (a) on-the-job training and (b) private automotive mechanic school.

Job Activity-by-Attribute Instrument - A total number of nine persons were sampled in the *Job Activity-by=Attribute Instrument*, five workers and four supervisors. 89

88 Present job positions for workers were in the field of automotive mechanics. For supervisors present positions were in the category of equipment maintance supervisor and shop foreperson.

Both supervisors and workers were employed in the new car dealership business. Supervisors had worked on the average of 31.7 years in the field of automotive mechanics and workers had 5.4 years of experience in the automotive mechanic field.

Workers reported receiving their automotive mechanic experience from on-the-job training. Supervisors reported receiving their experience from company training programs and on-the-job experience.

Summary - Respondents across the three instruments were generally employed in the automotive mechanic field. Supervisors were also employed in the automotive mechanic field, but in a variety of capacities including service manager, equipment maintenance supervisor, shop foreperson, service advisor, and garage owner.

With respect to the *Occupation-by-Attribute Instrument*, respondents represented a total of 145 years of job experience--eighty years for workers and sixty-five years for supervisors. Respondents received their automotive mechanic training from the following sources: on-the-job training and company training programs.

With respect to the *Occupation-by-Job Activity Instrument*, respondents represented a total of 142 years of work experience--seventy-four years for workers and sixty-eight years for supervisors. Respondents received their automotive mechanic experience from the following sources: on-the-job training, private automotive mechanic school, and company training program.

With respect to the *Job Activity-by-Attribute Instribute Instrument*, respondents represented a total of 154 years of work experience--27 years for workers and 127 years for supervisors. Respondents received their training in automotive mechanics from the following sources: on-the-job training programs and company training programs.

Data Analysis

This section identifies the procedure used, and portrays an analysis of the results obtained in relating job activities and the human attribute requirements of the job. The pilot test data, with respect to the three instruments, *Occupation-by-Job Activity*, *Occupation-by-Attribute*, and *Job Activity-by-Attribute* are presented so that refinements and revisions could subsequently be made. The results of the *Occupation-by-Job Activity* analysis are presented first; the results of the *Occupation-by-Attribute* analysis are presented next and the results of the *Job-Activity-by-Attribute* analysis follows.

Occupation-by-Job Activity Instrument

For each occupation (general secretary, business data programmer, and automotive mechanic), respondents were asked to rate the importance of each job activity to their occupation using a seven point scale: 0, not important; 4, important; and 7, very important. Median scores were used to determine how respondents felt with respect to importance of job activities.

94 95

Three point five (3.5) was the median score used to determine those activities which respondents felt were not important or marginally important. Median scores also serve as a determinant for delimiting those job activities which fell below three point five (3.5) during field testing. An analysis of the results showing only not important or marginally important job activities is presented in Table 2.

Table 2

GENERAL SECRETARY

JOB ACTIVITIES RATED AS NOT IMPORTANT OR MARGINALLY IMPORTANT USING 3.5 MEDIAN SCORES AND BELOW

N=5 Workers	N=4 Supervisor	N=9 Total
*16	7	
18	16	16
20	18	18
	19	
	22	

*denote job activity numbers

96

97

The job activities which all respondents felt were marginally important or unimportant for the occupation of general secretary were:

(16) arrange travel schedule, make travel reservations, and prepare vouchers for personnel

(18) supervise clerical workers

For this respective pilot test, respondents across roles were not involved in making travel reservations, etc., or supervising clerical workers. These particular job activities may or may not be performed by secretaries in other job environments. There exists supporting evidence to include and not eliminate these job activities in the field test based on the DOT job description.

Table 3 provides an analysis for the occupation of automotive mechanic

Table 3

AUTOMOTIVE MECHANIC

JOB ACTIVITIES RATED AS NOT IMPORTANT OR MARGINALLY IMPORTANT USING 3.5 MEDIAN SCORES AND BELOW

N=5 Workers	N=4 Supervisors	N=9 Total
*10		
16		
19		
21		

*denote job activity numbers

There was no job activity which all respondents felt was unimportant or marginally important for the job occupation of automotive mechanic.

Table 4 provides an analysis for the occupation of business data programmer.

Table 4

BUSINESS DATA PROGRAMMER

JOB ACTIVITIES RATED AS NOT IMPORTANT OR MARGINALLY IMPORTANT USING 3.5 MEDIAN SCORES AND BELOW

N=5 Workers	N=4 Supevisor	N=9 Total
*10	1	
	3	10
	10	
	16	
	19	
	20	

*denote job activity numbers

The job category which all respondents felt was marginally important or unimportant for the data business programmer occupation was (10) write program for local one time use. The nature of the job of business data programmer may suggest that the programmer is capable of writing a program which can be adapted or utilized for more than one occasion. It is doubtful whether this job activity will be retained in the field test.

Occupation-by-Attribute Instrument

Occupation-by-Attribute Instrument - Respondents were asked to rate the importance of each attribute in each respective occupation--business data programmer, general secretary, and automotive mechanic--using the same seven point scale as used in the *Occupation-by-Job Activity Instrument*. Median scores were again used to determine how respondents felt with respect to importance of the job attribute for a particular occupation.

In order to present an adequate description of those attributes which were either common across all three occupations or which were eliminated by respondents across all three occupations using the three point five (3.5) median score to rate significant or non significant, a comparison is provided in Appendix L for this respective sample surveyed. Additionally, to provide further comparison of attributes across the three occupational areas, the data for attributes rated by respondents as three point zero (3.0) and above are provided.

The attributes presented in Table 5 are the attributes which remained significant at a three point zero (3.0) level and above. Again, a comparison is presented across the three occupations. The data are displayed across the three occupations in order to provide a visual comparison across occupations and respondents sampled.

It was intended that the *Occupation-by-Attribute Instrument* would provide a means of identifying those attributes which respondents felt were unimportant or marginally important for a particular occupation without regard to the job activity performed within the occupation. This procedure was also intended to provide an approach to developing a methodology for delimiting those attributes which may have been insignificant for inclusion in the field test. For example, within certain occupations, particular attributes may not be as significant as others. This was particularly true for categories concerning general vocational capabilities, cognitive abilities, and psychomotor capabilities. This would tend to suggest that less emphasis might be placed on certain attributes within these categories irrespective of occupation and more emphasis placed upon actual job performance. This should not be interpreted, however, as indicating that attributes of the job are nonessential but is merely postulated to suggest that when attempting to delimit attributes based upon any sample, care should be exercised to include only those attributes which are essential to job performance.

An inspection of the data in Table 5 indicates very few attributes were considered necessary or important across occupations. However, an analysis of those attributes considered by this respondent group as necessary or important is as follows. The comparisons are made categorically. As noted, comparative analysis could be made in two categories:

General Vocational Capabilities -- *Arithmetic Computations*
Verbal Communication
Style and Grooming

Cognitive Abilities -- *Memory*
Verbal Comprehension
Spelling
Deductive Reasoning

TABLE 5

OCCUPATION BY ATTRIBUTE ANALYSIS ACROSS THE THREE OCCUPATIONS

General Category	Attribute		Automotive Mechanic	General Secretary	Business Data Programmer
General Vocational Capabilities	1.	Tools	7.0		
	2.	Mechanical Systems	7.0		
	3.	Stationary Machine and Equipment Operation	4.0		
	4.	Vehicular Operation	7.0		
	5.	Connections and Fittings	4.0		
	6.	Fluid Systems	6.0		
	7.	Measuring Instruments	6.0		
	8.	Electricity	7.0		
	9.	Layout and Visualization			
	10.	Structures			
	11.	Materials			
	12.	Chemicals			
	13.	Foods and Cooking			
	14.	Biological Systems			
	15.	Medical and First Aid			
	16.	Arithmetic Computation	4.0	4.0	4.0
	17.	Arithmetic Conventions		3.0	7.0

TABLE 5

OCCUPATION BY ATTRIBUTE ANALYSIS ACROSS THE THREE OCCUPATIONS

General Category	Attribute	Automotive Mechanic	General Secretary	Business Data Programmer
General Vocational Capabilities (Continued)	18. Clerical	____	7.0	____
	19. Verbal Communication	4.0	6.0	6.0
	20. Sales	____	____	____
	21. Service	6.0	____	____
	22. Dealing with Social Situations			
	23. Etiquette and Social Service			
	24. Style and Grooming	4.0	5.0	3.0
Cognitive Abilities	25. Closure	____	____	____
	26. Form Perception	____	____	____
	27. Perceptual Speed	3.0	7.0	____
	28. Spatial Scanning	____	____	____
	29. Spatial Orientation	____	____	____
	30. Visualization	3.0	____	____
	31. Number Facility	3.0	____	6.0
	32. Memory	6.0	7.0	5.0
	33. Verbal Comprehension	3.0	4.0	5.0
	34. Grammar	____	7.0	3.0

TABLE 5 (Cont.)

OCCUPATION BY ATTRIBUTE ANALYSIS ACROSS THE THREE OCCUPATIONS

General Category		Attribute	Automotive Mechanic	General Secretary	Business Data Programmer
Cognitive Abilities (Continued)	35.	Spelling	3.0	7.0	4.0
	36.	Expressional Fluency	____	____	4.0
	37.	Ideational Fluency	____	____	3.0
	38.	Sensitivity to Problems	5.0	____	5.0
	39.	Deductive Reasoning	6.0	3.0	6.0
	40.	Inductive Reasoning	3.0	____	6.0
	41.	Originality	4.0	____	3.0
	42.	Social Intelligence	____	4.0	____
	43.	Aesthetic Judgment	____	____	____
	44.	Musical Aptitude	____	____	____
Psychomotor Abilities	45.	Control Precision	6.0	____	____
	46.	Multilimb Coordination	7.0	____	____
	47.	Reaction Time	6.0	____	____
	48.	Eye-Hand Coordination			
	49.	Manual Dexterity	7.0	____	____
	50.	Finger Dexterity	7.0	6.0	____
	51.	Arm-Hand Steadiness	6.0	____	____
	52.	Explosive Strength	4.0	____	____

TABLE 5 (Cont.)

OCCUPATION BY ATTRIBUTE ANALYSIS ACROSS THE THREE OCCUPATIONS

General Category		Attribute	Automotive Mechanic	General Secretary	Business Data Programmer
Psychomotor Abilities (Continued)	53.	Static Strength	5.0	—	—
	54.	Dynamic Strength	6.0	—	—
	55.	Body Equilibrium	6.0	—	—
	56.	Stamina	6.0	—	—
Sensory Capacities	57.	Near Visual Acuity	7.0	6.0	—
	58.	Far Visual Acuity	4.0	—	—
	59.	Depth Perception	4.0	—	—
	60.	Color Discrimination	—	—	—
	61.	Auditory Acuity	5.0	—	—
	62.	Tactual Discrimination	4.0	—	—

Summary - A review of the findings for the *Occupation-by-Attribute Instrument* clearly indicates that no established pattern could be identified across occupations for eliminating attributes. It appeared that an attempt to do so based solely upon the input from the relatively small pilot test sample may be premature and biased. It may be anticipated, however, that considering other occupations which were not sampled in the pilot test would result in different attributes being retained or eliminated. Therefore, based upon the results of these findings and in consultation with the Project Advisory Committee, the decision was made to use in the subsequent field test only the following three categories of attributes: cognitive, sensory and psychomotor. It was also the consensus of the Project Advisory Committee that general vocational capabilities were appropriately addressed in some dimension within the three general categories of either cognitive, sensory, and/or psychomotor and that other available instruments would also be recommended to users which address the question of discerning interests and needs of individuals. The elimination of the categories of general vocational capabilities, interests, and needs resulted in an instrument easier to use by respondents and users. It also shortened the overall time needed to administer the instrument.

Job Activity-by-Attribute Instrument

Respondents were asked to rate the importance of each attribute by job activity in each respective occupation general secretary, business data programmer, and automotive mechanic using the same seven point scale used in the two previously described instruments. The purpose of this final process was to determine what commonalities, if any, existed across job attributes and occupations vis-a-vis job activities. Although job activities across the three occupations were dissimilar, the intent of this procedure was to determine any similarities with respect to those attributes which would remain or be deleted across occupations. In order to make an adequate comparison, the data are displayed in their original form across the three occupations and under general categorical labeling.

A complete matrix for the *Job Activity-by-Attribute Instrument* is displayed in Appendix M for the three occupational areas: automotive mechanic, general secretary, and business data programmer. Human attributes are displayed under the following six categories: general vocational capabilities (1-24); cognitive abilities (25-44); psychomotor abilities (45-56); sensory capabilities (57-62); interests (63-86); and needs (87-103). Median scores of three point five (3.5) were used to determine which attributes rated by total respondents across the three occupational areas were considered significant. The purpose of using 3.5 median scores and above as a requirement level for inclusion in the *Job Activity-by-Attribute Instrument* was to determine any commonality which may have existed across the occupations vis-a-vis for activities. Emphasis was placed upon noting the six categories in which particular attributes were rated as significant between three point zero (3.0) and three point five (3.5) and three point five (3.5) and above. The three point zero (3.0) cut off score was included as a further validation to discern any measurable significant differences between those attributes rated at three point five (3.5) and above and the attributes rated between three point zero (3.0) and three point five (3.5).

As mentioned in the results of the *Occupation-by-Attribute Instrument*, no attempt was made to delimit any human attributes based solely upon the results of this pilot test. Therefore, in the field testing of this instrument, the decision was made by the project staff in concert with the Project Advisory Committee to use only those attributes which again fell within the following three general categories: cognitive, sensory, and psychomotor. The categories of general vocation capabilities, interests, and needs were eliminated.

It is further noted that both instrument, i.e., *Occupation-by-Attribute* and *Job Activity-by-Attribute*, are used mutually exclusive of each other. In other words, human attributes requirements as perceived by the pilot test respondents may be different when considering the occupation alone as opposed to considering the job activities performed within the total occupation. However, the following results address the respondents' perception across all three occupations in toto.

General Vocational Capabilities - Inspection of the attributes under general vocational 120
capabilities for the occupation of automotive mechanic suggests that those attributes which
119 respondents felt were important to demonstrate included: tools, mechanical systems, stationary machine and equipment operation, vehicular operation, connections and fittings, fluid systems, measuring instruments, electricity, lay-out and visualization, structure, and materials. These

aforementioned attributes appear to fall within the hardware area considering the hardware-to-people continuum, emphasizing mechanical, electrical, spatial (including structures and layout and visualization) capabilities.

Those attributes which appear to form a cluster under general vocational capabilities for the occupation of general secretary using the three point five (3.5) median and above score included only the following: clerical, verbal communication, and style and grooming. This would suggest on the hardware-to-people continuum that respondents felt the knowledge of people was a more important skill to acquire.

On the other hand, for the occupation of business data programmer under the category of general vocational capabilities, the cluster of attributes were found in the area of numerical operations, including arithmetic conversions and arithmetic computation, suggesting that for that particular occupation, numerical operations is an important and/or necessary attribute to demonstrate.

Cognitive Abilities - The findings in the category of cognitive abilities show a much closer similarity across occupations particularly between the occupations of general secretary and business data programmer. This might be expected since this category is concerned with relative intellectual capacities involving perception, recognition, reaching conclusions, etc., which are capacities endemic to most occupations. The same, however, was not true for automotive mechanics. Respondents felt that the only attributes which were important in this occupation and which formed a cluster included: visualization, memory, deductive reasoning, and inductive reasoning.

Similarities among attributes were noted in the general secretary and data programmer occupation and included the following: memory, verbal comprehension, expressional fluency, ideational fluency, sensitivity to problems, deductive reasoning, inductive reasoning, and originality. Clusters which appeared in the data programmer category but not in the other occupations were attributes concerned with number facility. Grammar and spelling did appear to be important attributes for the occupation of general secretary as expected.

Psychomotor Abilities - Psychomotor abilities involve bodily movement, usually in coordination with sensory processes. Identifiable clusters were found in both automotive mechanic and general secretary occupations. Those attributes included: control precision, multilimb coordination, reaction time, eye-hand coordination, manual dexterity, finger dexterity, and arm-hand steadiness. Additionally, under the occupation of automotive mechanic, respondents indicated that bodily equilibrium was a significant attribute to demonstrate. Regarding the occupation of business data programmer, it appears that bodily or muscular coordination is not an attribute of importance.

Sensory Capabilities - Attribute relationships across the three occupations were not significant in the category of sensory capabilities. The only attribute which appeared across the three occupations--automotive mechanic, general secretary, and business data programmer--was near visual acuity, which was predictable since it deals with the ability to visually discriminate detail at normal reading distance or less.

For automotive mechanic, additional attributes which were indicated as important included the following: far visual acuity, depth perception, and color discrimination. It was interesting to note that respondents for automotive mechanic did not feel tactual discrimination was an important attribute to possess. Auditory acuity was the only other additional attribute to show any type of cluster pattern for the occupation of general secretary. This finding could be expected since some secretaries have to transcribe from a dictaphone machine and the attribute of sound and/or hearing is needed to perform this function.

Interests - This particular category is concerned with preferences for, attractions toward, or liking of various classes of activities. Therefore, it was predictable that no attributes would cluster across occupations. The noticeable exception was the numerical attribute which appeared in both data programmer and general secretary. However, for the occupation of automotive mechanic, the following internal clusters were noted: inspecting and testing, crafts and precise operations, and training. The only internal clusters presented in the general secretary occupation included: clerical work, numerical, and promotion and communication.

These attributes also appear to be consistent with those listed under general vocational capabilities for business data programmer, which include arithmetic computation and arithmetic conventions.

Needs - This final attribute category is also concerned with preferences, desires, or felt wants for various classes of outcomes or activities. As might be expected, when respondents had an opportunity to answer on a level of desirability, more clustering patterns across occupations were noted. The similarity in clustering of attributes across occupations was most noticeable in the following attributes: ability utilization, achievement, activity, compensation, co-workers, responsibility, and working conditions. Within the occupation of automotive mechanic, the cluster of attributes not previously mentioned included: recognition, security, and variety.

Further examination of the matrix revealed the largest clustering of attributes for the occupation of general secretary. This was true for both total clustering of attributes across general categorical listings and occupations. All attributes in the category for the occupation of general secretary displayed a clustering pattern including those attributes previously mentioned and the following: advancement, authority, creativity, independence, moral values, responsibility, and social service.

Finally, with respect to the occupation of business data programmer, the least number of clustering of attributes was noted and included only those attributes which showed a commonality across the three occupations.

Summary - As previously mentioned, no attempt in this process was made to delimit attributes predicated on the preceptions of the pilot test respondents, but merely to provide some indications of the attributes necessary to perform particular types of job activities. As indicated, patterns of commonality of attributes could not be clearly established. This suggests again, that for certain types of occupations, and depending on the job activity within that occupation, certain human attributes will be required to perform that occupation and/or job activity and certain attributes will not be necessary. Indication of the human attribute requirements in both the job activity and for the occupation will provide the users, i.e., vocational couselors, placement personnel, rehabilitation counselors, etc., with some guidance in counseling individuals. In other words, requirements of the human attribute vary significantly with respect to attributes required for the occupation as opposed to attributes required for the aggregated job activities within the occupations.

CHAPTER II

FIELD TEST

Field Test Procedures

This part of the *Procedures Manual* relates to all activities undertaken in the field test preparation and analysis. The field testing of the instrument followed the same procedures as in the pilot test and is predicated, in part, on the data gleaned in that research. This part of the manual includes an analysis of the methodologies used in (a) preparing comprehensive Dictionary of Occupational Titles statement; (b) reviewing and simplifying attribute statement; (c) identifying and surveying national respondents representative of the three occupations; and (d) analyzing the results of the field test data.

Preparing Occupational Statements

The Dictionary of Occupational Titles (DOT) published by the Department of Labor and currently under revision, was found to be the most comprehensive and accessible source of reference for providing a description and list of the major tasks (job activities). Due to its ready availability to practitioners (those in state and regional agencies serving the need of guidance, placement, and instructional personnel), the Dictionary of Occupational Titles was selected as the final reference for aggregated tasks (job activities).

Since the Dictionary of Occupational Tiles is compiled in paragraphic form, the major job activities were extracted and edited to conform to standard task inventory sentence structure. Tables 6 through 8 display a comparison between the paragraphic form in the Dictionary of Occupational Titles and edited version conforming to standard task inventory sentence structure. Table 6 provides the data for comparison for the occupation of general secretary. Table 7 provides the data for comparisons for the occupation of business data programmer, and Table 8 provides the data for the comparison for the occupation of automotive mechanic.

Basically, the same procedure was followed for each occupation. In order to conform to standard task inventory format, job activity statements were written in present third person plural tense. All sentences containing negative adverbs were rewritten to conform to present tense. See instrumentation in the field test data, Appendix N for the final version for the *Job Activity-by-Attribute Instrument* used for the three occupations.

Basically, each job activity statement appears on a separate page of the *Job Activity-by-Attribute Instrument*, but appears in a condensed form in Appendix N for illustration purposes. The *Occupation-by-Attribute Instrument* is contained in Appendix O for the three occupations. Once the job activity statements had been compiled, it was necessary to revise and simplify the attribute statements to form the field test instruments.

TABLE 6

DICTIONARY OF OCCUPATIONAL TITLES - PARAGRAPHIC FORM FOR THE OCCUPATION OF GENERAL SECRETARY

SECRETARY (clerical) 201.368. girl friday; secretarial stenographer. Schedules appointments, gives information to callers, takes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail; reads and routes incoming mail, locates and attaches appropriate file to correspondence to be answered by employer. Takes dictation in shorthand or on Stenotype machine (STENOTYPE OPERATOR) and transcribes notes on typewriter, or transcribes from voice recordings (TRANSCRIBING-MACHINE OPERATOR). Composes and types routine correspondence. Files correspondence and other records. Answers telephone and gives information to callers or routes call to appropriate official and places outgoing calls. Schedules appointments for employer. Greets visitors, ascertains nature of business, and conducts visitors to employer or appropriate person. May not take dictation. May arrange travel schedule and reservations. May compile and type statistical reports. May supervise clerical workers. May keep personnel records (PERSONNEL CLERK). May record minutes of staff meetings.

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TABLE 6A

DICTIONARY OF OCCUPATIONAL TITLES - EDITED VERSION FOR THE OCCUPATION OF GENERAL SECRETARY

1. Read and route incoming mail.
2. Locate and attach appropriate file to correspondence to be answered by employer.
3. Take dictation in shorthand or on Stenotype machine.
4. Transcribe notes on typewriter or transcribe from voice readings.
5. Compose routine correspondence.
6. Type routine correspondence.
7. File correspondence and other records.
8. Answer telephone and give information to callers.
9. Route calls to appropriate officials.
10. Place outgoing calls.
11. Greet visitors, ascertain nature of business, and conduct visitors to employer or appropriate person.
12. Take dictation.

TABLE 6A (CONTINUED)

DICTIONARY OF OCCUPATIONAL TITLES, EDITED VERSION FOR THE OCCUPATION OF GENERAL SECRETARY

13. Arrange travel schedule and reservations.
14. Compile and type statistical reports.
15. Supervise clerical workers.
16. Record minutes of staff meetings.
17. Schedule appointments for employers.

TABLE 7

DICTIONARY OF OCCUPATIONAL TITLES - PARAGRAPHIC FORM FOR THE OCCUPATION OF BUSINESS DATA PROGRAMMER

PROGRAMMER, BUSINESS (profess. & Kin.) 020.188. digital-computer programmer. Converts symbolic statement of business problems to detailed logical flow charts for coding into computer language and solution by means of automatic data-processing equipment. Analyzes all or part of workflow chart or diagram representing business problem by applying knowledge of computer capabilities, subject matter, algebra, and symbolic logic to develop sequence of program steps. Confers with supervisor and representatives of departments affected by program to resolve questions of program intent, output requirements, input data acquisition, extent of automatic programming and coding use and modification, and inclusion of internal checks and controls. Writes detailed logical flow chart in symbolic form to represent work order of data to be processed by computer system, and to describe input, output, and arithmetic and logical operations involved. May convert detailed logical flow chart to language processable by computer. Devises sample input data to provide test of program adequacy. Prepared block diagrams to specify equipment configuration. Observes or runs tests of coded program on computer, using actual or sample input data. Corrects program errors by such methods as altering program steps and sequence. Prepares written instructions (run book) to guide views, and rewrites programs to increase operating efficiency or adapt to new requirements. Compiles documentation of program development and subsequent revisions. May specialize in writing programs for one make and type of computer.

TABLE 7A

DICTIONARY OF OCCUPATIONAL TITLES - EDITED VERSION FOR THE OCCUPATION OF BUSINESS DATA PROGRAMMER

1. Analyze all or part of workflow chart or diagram representing business problem by applying knowledge of computer capabilities, subject matter, algebra, and symbolic logic to develop sequence of program steps.

2. Confer with supervisor and representatives of departments affected by programs to resolve questions of program intent, output requirements, input data acquisition, extent of automatic programming and coding use and modification, and inclusion of internal checks and controls.

3. Write detailed logical flow chart in symbolic form to represent work order of data to be processed by computer system, and to describe input, output, and arithmetic and logical operations involved.

4. Convert detailed logical flow chart to language processable by computer.

5. Devise sample input data to provide test of program adequacy.

6. Prepare block diagrams to sepcify equipment configuration.

7. Observe or run test of coded program on computer, using actual or sample input data.

8. Correct program errors by such methods as altering program steps and sequence.

9. Prepare written instructions (run book) to guide operating efficiency or adapt to new requirements.

TABLE 7A (CONTINUED)

DICTIONARY OF OCCUPATIONAL TITLES
EDITED VERSION FOR THE OCCUPATION OF BUSINESS DATA PROGRAMMER

10. Analyze, review, and rewrite program to increase operating efficiency or adapt to new requirements.
11. Compile documentation of program development and subsequent revisions.
12. Write program for one make and type of computer.

TABLE 8

DICTIONARY OF OCCUPATIONAL TITLES - PARAGRAPHIC FORM FOR THE OCCUPATION OF AUTOMOTIVE MECHANIC

AUTOMOTIVE MECHANIC (auto. serv.) 620.281, automobile repairman; automobile-service mechanic; garage man; garage mechanic; garage repairman. Repairs and overhauls automobiles, buses, trucks, and other automotive vehicles; examines vehicle and discusses with customer or AUTOMOBILE-REPAIR-SERVICE SALESMAN; AUTOMOBILE TESTER: or BUS INSPECTOR nature and extent of damage or malfunction. Plans work procedure, using charts, technical manuals, and experience. Raises vehicle, using hydraulic jack or hoist, to gain access to mechanical units bolted to underside of vehicle. Removes unit, such as engine, transmission, or differential, using wrenches and hoist. Disassembles unit and inspects parts for wear, using micrometers, calipers, and thickness gauges. Repairs or replaces parts such as pistons, rods, gears, valves, and bearings, using mechanic's handtools. Overhauls or replaces carburetors, blowers, generators, distributors, starters, and pumps. Rebuilds parts, such as crankshafts and cylinder blocks, using lathes, shapers, drill presses, and welding equipment. Rewires ignition system, lights, and instrument panel. Refines and adjusts brakes, aligns front end, repairs or replaces shock absorbers, and solders leaks in radiator. Mends damaged body and fenders by hammering out or filling in dents and welding broken parts. Replaces and adjusts headlights, and installs and repairs accessories, such as radios, heaters, mirrors, and windshield wipers. May be designated according to specialty as AUTOMOBILE MECHANIC, MOTOR: BUS MECHANIC, DIFFERENTIAL REPAIRMAN: ENGINE-REPAIR MECHANIC, BUS; FOREIGN-CAR MECHANIC; TRUCK MECHANIC. See volume II for additional titles.

TABLE 8A

DICTIONARY OF OCCUPATIONAL TITLES - EDITED VERSION FOR THE OCCUPATION OF AUTOMOTIVE MECHANIC

1. Examine vehicle and discuss with customer or automobile-repair-service salesperson, automobile tester, etc., nature and extent of damage or malfunction.

2. Plan work procedure, using charts, technical manuals, and experience.

3. Raise vehicles, using hydraulic jack or hoist, to gain access to mechanical units bolted to underside of vehicle.

4. Remove units, such as engine, transmission, or differential, using wrenches and hoist.

5. Disassemble unit, and inspect unit parts for wear using micrometers, calipers, and thickness gauges.

6. Repair parts such as pistons, rods, gears, valves, and bearings using mechanic's handtools.

7. Overhaul carburetors, blowers, generators, distributors, starters, and pumps.

8. Replace carburetors, blowers, generators, distributors, starters, and pumps.

TABLE 8A (Continued)

DICTIONARY OF OCCUPATIONAL TITLES - EDITED VERSION
FOR THE OCCUPATION OF AUTOMOTIVE MECHANIC

9. Rebuild parts, such as crankshaft and cylinder blocks, using lathes, shapers, drill presses, and welding equipment.

10. Rewire ignition system, lights, and instrument panel.

11. Reline and adjust brakes.

12. Align front end.

13. Repair or replace shock absorbers.

14. Solder leaks in radiator.

15. Mend damaged body and fenders by hammering out or filling in dents and welding broken parts.

16. Replace and adjust headlights.

17. Install and repair accessories, such as radios, heaters, mirrors, and windshield wipers.

Simplifying Attribute Statements

The original attribute statements extrapolated from the Attribute Requirement Inventory developed by Neeb, Cunningham, and Tuttle, Center for Occupational Education, North Carolina State University, used in the pilot test of this project were rewritten for simplification and exactness based upon the advice and recommendations of the Project Advisory Committee. Appendix J contains the original definitions used in the pilot testing of the human attribute requirements of jobs.

The original inventory contained five categorical headings: *General Vocational Capabilities* (1-24); *Cognitive Abilities* (25-44); *Psychomotor Abilities* (45-56); *Sensory Capacities* (57-62); *Interests* (63-86); and *Needs* (87-103). The revised inventory submitted for field testing contained only the following three categorical headings: *Cognitive Abilities,* (1-20); *Psychomotor Abilities,* (21-52) and *Sensory Capacities* (33-38).

Additionally, several other structural as well as grammatical changes were made in the second inventory. For example, general categorical definitions were simplified and a comparison is given in Figure 1. The revised definition booklet is contained in Appendix P.

FIGURE 1

Comparison Between Original and Revised Categories

A. Original Inventory Definition of Cognitive Abilities

COGNITIVE ABILITIES

General and relatively stable intellectual capacities involving perceiving, recognizing, remembering, conceiving, reasoning, creative thinking, judging, etc. Cognitive abilities are prerequisite to performance on a wide variety of specific tasks. A distinguishing characteristic of cognitive abilities--in comparison to psychomotor abilities and affective states (such as needs and interests)--is a relatively high state of consciousness or awareness of one's behavior

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B. Revised Inventory Definition of Cognitive Abilities

COGNITIVE ATTRIBUTES

The qualities of knowing including both awareness and judgment involving perceiving, recognizing, remembering, conceiving, reasoning, thinking creatively, etc. A general characteristic of cognitive attributes is a relatively high state of consciousness or awareness of one's behavior.

The final questionnaire contained the same number of attributes in the categories of Cognitive, Sensory, and Psychomotor as in the pilot test. As previously mentioned, the categories of General Vocational Capabilities, Interest, and Needs were eliminated. Recommendations of acceptable inventories to be used in assessing Interests and Needs will be recommended in an appropriate appendix of this document. The completed questionnaire used in the field test is contained in Appendix R.

Secondly, attribute statements were rewritten to reflect present tense and example of activities statements were changed to reflect more generic connotations. Examples of the changes using the attribute of closure appear in Figure 2.

FIGURE 2

Comparison between Original and Revised Attribute Statements

A. Original Attribute Definition and Example

Closure: The ability to organize a disorganized or ambiguous visual field into a single percept, with or without knowledge of any of the specific configurations contained in the field. Examples of job activities requiring a substantial amount of closure are: an aerial-photograph interpreter examining a photograph for camouflaged military installations; a technician examining cell patterns under a microscope; an astronomer interpreting celestial phenomena; etc.

B. Revised Attribute Definition and Example

	Definition	Example
Closure -	organize a disorganized or an obscure visual field into a single impression, with or without knowledge of any of the specific forms contained in the field	examine structure patterns using an instrument; inspect or investigate shaped/designs for background detail.

Field Test Participant Information

This section describes the procedures used in the identification of the respondents who participated in the field test research. The discussion which follows describes the sample across their respective job categories as they responded within each rating instrument for both worker and supervisor.

Twenty respondents were selected for each of the three occuaptional areas: general secretary, automotive mechanic and business data programmer. Each respondent was asked to respond to two questionnaires: *Occupation-by-Attribute*, and *Job Activity-by-Attribute Instrument.* Extensive efforts were made to insure an equal representation of workers and supervisors in the data collection. In addition, data were obtained from a geographical cross section of local and national respondents. The following criteria were utilized:

a) Fifty percent of the respondents were to be from states other than Ohio

b) Supervisors and workers were to be utilized in the data collection process

c) A minimum level of five years of work experience was to be established

d) Respondents would represent business, government, education, and industry

e) Selected firms would represent a diversity within the occupations.

Field Test Participant Data Analysis

The field test respondent data analysis provides a brief descriptive analysis of the sample surveyed in the field test. It includes a breakdown for each occupation regarding type of position held within the occupation, type of business, average number of years employed within that position, and where the training was received. This information is provided for both instruments and is done so by occupational area.

GENERAL SECRETARY

The same sample responded to both *Occupation-by-Attribute* and *Job-Activity-by-Attribute Instruments.* Fifteen workers and seven supervisors responded.

Present job positions for workers were primarily in the typist (33 percent) and general secretary category (40 percent). Twenty percent of the workers were employed in the capacity of administrative assistant. Supervisors in the sample were primarily employed in the capacity of business and occupational instructors (40 percent), administrative assistant (33 percent). The remaining job responsibilities for supervisors included one office manager and one executive secretary.

The type of business in which most workers were employed included public service organizations, (28 percent) government (22 percent) and manufacturing (14 percent). Other categories for workers included: distribution and educational and research types of business, alumi associations and consumer affairs. Among supervisors, 63 percent of the respondents were employed in the educational and research fields, 25 percent in governmental agencies, and the remaining respondents were employed in health and/or related fields.

The average number of years employed on the present job was two years for workers and four years for supervisors. The average number of years employed in the secretarial field for workers was seven years and eight years for supervisors. Both supervisors and workers worked with one other secretary in performing their duties. Supervisors, in this sample, were responsible on the average for eight other persons and workers were responsible for two other persons.

Sixty-two percent of the workers responded that they primarily received their training on the job (self-learned); forty-two percent received training in public secondary schools. In addition, the same workers also responded that public vocational-technical schools and/or private business schools contributed to their training in the secretarial field. Additional training was also received from a college or university. Forty-one percent of the supervisors, on the other hand primarily received their training at the college or university level. Public secondary schools accounted for thirty-three percent of the training for supervisors while twenty-five percent of the supervisors indicated they received their training on the job.

Summary - Respondents for the two instruments, both supervisors and workers, were primarily employed as instructors and/or general secretaries. Most respondents were employed as instructors and/or general secretaries and were employed in governmental and/or educational and research fields. Respondents, as a group, represented a total of 62 years of work experience; 31 years for workers and 31 years for supervisors; and had worked in the secretarial field for a combined 169 years; 68 years for supervisors and 101 years for workers. Respondents performed their tasks with twenty-five other secretaries--six persons for supervisors and nineteen persons for secretaries--and were responsible for a total of eighty-eight other persons--sixty-four for supervisors and twenty-four for workers. Training in the secretarial field was obtained primarily from the college or university level for supervisors and on-the-job (self-learned) and public secondary schools for workers.

AUTOMOTIVE MECHANIC

The same sample responded to both *Occupation-by-Attribute* and *Job Activity-by-Attribute Instruments* with useable responses and completed background data. Twelve workers and five supervisors responded.

Present job positions for workers were primarily as automotive mechanics, 50 percent. Another 41 percent of the workers were performing jobs as teachers and/or instructors in automotive training programs. Supervisors were employed also in the capacity of instructors of automotive training programs and/or department heads (50 percent), and/or service managers (20 percent).

The type of business in which workers were employed were new car dealerships, 41 percent, and postsecondary training programs, 41 percent. Sixteen percent of worker respondents were employed in independent garages. Supervisors, on the otherhand, were primarily employed as postsecondary and/or secondary vocational instructors. A total of 80 percent were so employed. The remaining 20 percent of the supervisors were employed in new car dealerships.

The average number of years that workers had worked at their present jobs represented a total of 6.5 years and the average number of years for supervisors was 3.2 years. Workers, on the average, had been employed as automotive mechanics for 13.5 years, and supervisors had been so employed for an average of 12.4 years. Workers generally worked with five other persons in performing their duties, and supervisors generally worked with three other persons in performing their duties. On the average, supervisors were responsible for fourteen persons in performing their duties and workers were responsible for nine other persons.

Sixty-six percent of the workers reported they had received their training in automotive mechanics on-the-job (self-learned). They also reported that they had received training from a company training program, (50 percent) and/or private automotive mechanics schools (58 percent). On the other hand, supervisors reported receiving their training primarily on the job (self-learned), 100 percent. Additionally, 45 percent of the supervisors responding indicated that military experience, company training programs, and/or military training schools accounted for training experiences in automotive mechanics.

Summary - Respondents for the two instruments, both supervisors and workers, were primarily employed as instructors and/or teaching supervisors in secondary and postsecondary schools. Most respondents, particularly supervisors, were employed in high school and/or postsecondary technical training institutions. Workers were primarily employed in new car dealerships. Respondents, as a group, represented a total of 81 years of work experience on their present jobs and 225 combined years in the field as automotive mechanics. They had worked with a total of 61 other persons in performing their duties, and were responsible for a total of 110 persons in their capacity. Most supervisors received their training from on the job (self-learned) and/or company training programs or military experiences. Workers, too, primarily received their training from either on-the-job (self-learned) and/or private automotive mechanic school and/or company training programs.

BUSINESS DATA PROGRAMMER

The same sample responded to both *Occupation-by-Attribute* and *Job Activity-by-Attribute Instruments.* Seventeen workers and seven supervisors responded.

Present job positions for workers were primarily in the following capacities: 36 percent of the workers were employed as either program instructors within system analyst programs and/or system programmers; 18 percent of the workers were employed as system engineers or programmers; 27 percent of the workers were employed as senior programmers; and the remaining workers were employed either as system and procedures analysts or junior programmers.

Forty-two percent of the supervisors, on the other hand, were employed as technical instructors or managers, or managers of data processing operations.

The type of business in which most workers were employed involved the following areas: 47 percent of the respondents were employed in distribution (wholesale-retail); 23 percent in data processing service bureaus; 17 percent in research and education, and the remaining in capacities of manufacturing, insurance, and/or banking finance. Supervisors, however, were primarily involved in work relating to data processing service bureaus, and/or research and education (56 percent), and manufacturing or insurance fields.

The average number of years that workers were employed at their present jobs was 2.4 years, and for supervisors, 7.2 years. The average number of years that workers were employed in the data processing field was 7.7 years, and for supervisors, 9.2 years. Workers were involved with approximately seven other persons in performing their duties and supervisors were involved with approximately sixty other persons in performing their duties. Supervisors, in this sample, were responsible for approximately six other persons and workers were responsible for approximately one other person.

Sixty-four percent of the workers responded that they primarily received their training from colleges or universities while 52 percent of the workers indicated that on-the-job (self-learned) training accounted for their experience. An additional 32 percent indicated they had received their training from a company in-plant training program and 27 percent of the workers received their training from equipment manufacturers' training programs.

Similarly, supervisors received their training primarily from colleges or universities (57 percent).

Summary - Respondents to the two instruments, both supervisors and workers, were primarily employed as managers (especially supervisors) and system programmers and/or program instructors within system analyst programs. Most respondents were employed within data processing service bureaus, research and education, and/or distribution (wholesale--resale). The latter business was particularly true for workers. Respondents as a group represented a total of 93 years of work experience on their present jobs, and 196 combined years in the field of data processing. They had worked with a total of 558 other persons in performing their duties, and were responsible for a total of 62 other persons in their respective capacities. Most supervisors and workers received their training from colleges or universities and/or company in-plant training programs.

Data Analysis

This section contains a general analysis of the results obtained in the field test procedure of this methodology. Like the pilot test using the same instrument, i.e., *Occupation-by-Attribute* and *Job Activity-by-Attribute*, the purpose of the field test procedure was not to delineate attributes, but to validate the procedures used to relate the capabilities of the handicapped to the human attribute requirements of jobs using a larger and more diverse geographical population.

In order to present an accurate analysis, the data are presented in the following format:

(a) Data are presented according to the three occupational areas sampled--general secretary, automotive mechanics, and business data programmer.

(b) The attributes are examined separately according to the categories of Cognitive Attributes, Psychomotor Attributes, and Sensory Capacity Attributes.

(c) Each of the three categories of attribute requirements is related to specific job activities within the Job Activity-by-Attribute Instrument and to the occupation as a whole within the Occupation-by-Attribute Instrument.

For each occupation (general secretary, automotive mechanic, and business data programmer), respondents were asked to rate the importance of each attribute using the seven point scale below.

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FIGURE 3

Instrument Rating Scale

To perform this job activity, demonstration of this attribute is:

0 Not required
1 Required to a very minimal degree
2 Required to a minimal degree
3 Required to a low moderate degree
4 Required to a moderate degree
5 Required to a high moderate degree
6 Required to a high degree
7 Required to a very high degree

Due to the nature of this type of data, i.e., the probability of extremely skewed responses due to the varying nature of tasks within the occupations, median scores were used as the method of statistical analysis of the data. Further, in order to differentiate significant scores from non significant scores, an arbitrary indicator of three point five (3.5) was selected which represents the mid-point on the seven-point scale. The result was that the data was being placed in a dichotomous situation which would facilitate usage between counselors and students in determining which attributes were significant for an individual to demonstrate.

The data are presented according to occupational areas in order to facilitate the analysis and profiling of the attributes. The *Occupation-by-Attribute Instrument* analysis is presented first since this represents the gestalt of the job activities. An analysis of the *Job-Activity* *by-Attribute Instrument* follows which delineates the job activities per each attribute. Additional statistical analyses were performed on both instruments including mean, mode, standard deviation, standard error of the mean, and variance. These analyses, however, will not be interpreted and were performed as part of a packaged statistical program. They appear in Appendix Q for both instruments.

AUTOMOTIVE MECHANIC

Table 9 presents the data for the occupation of automotive mechanic for the *Occupation-by-Attribute Instrument*. A complete profile of this instrument for the occupation of automotive mechanic is presented in Appendix R.

As seen in Table 9, 75 percent of the attributes under the category of *Cognitive Attributes* were preceived as significant at a 3.5 level and above by the twenty respondents surveyed. The following attributes under this category were not rated as significant and included: grammar, spelling, originality, aesthetic judgment, and musical aptitude. These results do not appear to be consistent with the results reported in the pilot test. A noticeable discrepancy did exist in the attributes reported by the pilot test respondents in this category (see Table 5) as significant and those rated as significant by the field test respondents. No statistical analyses were performed to determine the degree of significant difference between the two analyses, but a conjecture can be made that the difference may be due, in part, to the sample surveyed, i.e., local respondents versus a

TABLE 9

STATISTICAL SCORES OF HUMAN ATTRIBUTES

Occupation: Automotive Mechanic–Occupation by Attribute

Human Attributes	Median	Mean	Mode	Stand. Devia.	Stand. Error	Variance
A. Cognitive Attribute						
1. Closure	4.35	4.35	4.00	1.26	.28	1.60
2. Form Perception	4.66	4.80	4.00	1.28	.28	1.64
3. Perceptual Speed	4.10	4.05	4.00	1.63	.36	2.68
4. Spatial Scanning	4.00	4.10	3.00	1.48	.33	2.20
5. Spatial Orientation	4.50	4.55	6.00	1.46	.32	2.15
6. Visualization	4.00	4.00	3.00	1.48	.33	2.21
7. Number Facility	4.21	4.30	4.00	1.45	.32	2.11
8. Memory	5.16	5.20	5.00	1.32	.29	1.74
9. Verbal Comprehension	4.07	3.75	4.00	1.65	.36	2.72
10. Grammar	2.83	2.80	3.00	1.47	.32	2.16
11. Spelling	2.92	2.80	3.00	1.36	.30	1.85
12. Expressional Fluency	3.83	3.95	3.00	1.53	.34	2.36
13. Ideational Fluency	3.50	3.70	3.00	1.21	.27	1.48
14. Sensitivity to Problems	5.16	4.95	6.00	1.50	.33	2.26
15. Deductive Reasoning	5.25	5.10	6.00	1.33	.29	1.77
16. Inductive Reasoning	3.92	3.65	4.00	1.95	.43	3.81
17. Originality	2.50	2.30	3.00	1.55	.34	2.43
18. Social Intelligence	3.92	3.50	4.00	1.93	.43	3.73
19. Aesthetic Judgment	1.50	2.10	.00	1.88	.42	3.56
20. Musical Aptitude	.50	1.45	.00	1.82	.40	3.31
B. Psychomotor Attribute						
21. Control Precision	5.50	5.45	6.00	.99	.22	.99
22. Multilimb Coordination	5.33	5.50	5.00	1.19	.26	1.42
23. Reaction Time	5.30	5.25	6.00	1.16	.26	1.35
24. Eye-Hand Coordination	6.05	5.95	6.00	.94	.21	.89
25. Manual Dexterity	5.66	5.75	5.00	.91	.20	.82
26. Finger Dexterity	5.83	5.85	5.00	.93	.20	.87
27. Arm-Hand Steadiness	5.50	5.50	5.00	1.05	.23	1.10
28. Explosive Strength	4.75	4.70	4.00	1.62	.36	2.64
29. Static Strength	5.00	5.05	5.00	1.23	.27	1.52
30. Dynamic Strength	5.50	5.25	6.00	1.48	.33	2.19
31. Body Equilibrium	5.16	5.30	4.00	1.12	.25	1.27
32. Stamina	4.25	4.60	3.00	1.78	.40	3.20
C. Sensory Capacity Attribute						
33. Near Visual Acuity	5.16	5.25	5.00	1.20	.27	1.46
34. Far Visual Acuity	3.94	3.95	4.00	1.50	.33	2.26
35. Depth Perception	4.50	4.70	4.00	1.21	.27	1.48
36. Color Discrimination	3.92	3.70	4.00	2.00	.44	4.01
37. Auditory Acuity	5.10	5.15	5.00	1.18	.26	1.39
38. Tactual Discrimination	5.07	4.80	5.00	1.34	.30	1.81

national sample and the variety of automotive mechanics sampled in the field test.

In the remaining two categories, i.e., *psychomotor attributes* and *sensory capacity attributes*, all attributes under these two categories were rated as significant at a 3.5 level and above.

These results appear to be consistent with those reported in the pilot test for those two categories with two exceptions. Under the category of *psychomotor abilities* (see Table 5), eye-hand coordination was not perceived as significant by the pilot test respondents, and under the category of *sensory capacities* (see Table 5), color discrimination was not perceived by the pilot test respondents as significant.

GENERAL SECRETARY

Table 10 presents the data for the occupation of general secretary for the *Occupation-by-Attribute Instrument.* A complete profile of this instrument for the occupation of general secretary is presented in Appendix R.

As seen in Table 10, 70 percent of the attributes under the category or *cognitive attributes* were perceived as significant at a 3.5 level and above by the twenty respondents surveyed. The following attributes under this category were not rated as significant and included: closure, form perception, spatial orientation, inductive reasoning, aesthetic judgment and musical aptitude. These results appear to be somewhat consistent with the results of the pilot test respondents for this category (see Table 5).

TABLE 10

STATISTICAL SCORES OF HUMAN ATTRIBUTES

Occupation: General Secretary–Occupation by Attribute

Human Attributes	Median	Mean	Mode	Stand. Devia.	Stand. Error	Variance
A. Cognitive Attribute						
1. Closure	2.00	2.36	.00	2.36	.54	5.57
2. Form Perception	3.00	2.75	.00	2.33	.52	5.46
3. Perceptual Speed	5.83	5.60	6.00	1.31	.29	1.72
4. Spatial Scanning	4.25	3.70	5.00	2.00	.44	4.01
5. Spatial Orientation	2.50	2.80	1.00	1.82	.40	3.32
6. Visualization	5.91	2.15	.00	2.43	.55	1.00
7. Number Facility	4.00	3.80	4.00	1.64	.36	2.69
8. Memory	5.50	4.30	6.00	2.67	.59	7.16
9. Verbal Comprehension	6.66	6.05	7.00	1.76	.39	3.10
10. Grammar	6.78	6.45	7.00	1.19	.26	1.41
11. Spelling	6.83	6.45	7.00	1.27	.28	1.62
12. Expressional Fluency	6.00	5.25	7.00	2.12	.47	4.51
13. Ideational Fluency	4.07	4.00	4.00	1.94	.43	3.78
14. Sensitivity to Problems	4.50	4.35	7.00	2.25	.50	5.08
15. Deductive Reasoning	4.50	4.00	5.00	2.17	.48	4.73
16. Inductive Reasoning	2.50	2.75	.00	2.33	.52	5.46
17. Originality	3.75	3.60	4.00	2.16	.48	4.67
18. Social Intelligence	4.83	4.60	4.00	2.23	.49	4.98
19. Aesthetic Judgment	1.30	2.55	.00	2.66	.59	7.10
20. Musical Aptitude	.02	.15	.00	.67	.15	.95
B. Psychomotor Attribute						
21. Control Precision	1.50	2.35	.00	2.54	.56	6.45
22. Multilimb Coordination	3.50	3.45	3.00	2.39	.53	5.73
23. Reaction Time	4.00	3.90	4.00	2.40	.53	5.77
24. Eye-Hand Coordination	4.50	4.05	6.00	2.54	.56	6.47
25. Manual Dexterity	2.50	2.70	.00	2.43	.54	5.90
26. Finger Dexterity	2.50	3.55	7.00	2.87	.64	8.26
27. Arm-Hand Steadiness	3.16	3.45	6.00	2.30	.51	5.31
28. Explosive Strength	.21	.60	.00	1.09	.24	1.20
29. Static Strength	.50	1.25	.00	1.65	.36	2.72
30. Dynamic Strength	.40	.95	.00	1.43	.32	2.05
31. Body Equilibrium	3.00	2.65	.00	2.35	.50	5.08
32. Stamina	3.00	3.00	1.00	2.49	.57	6.22
C. Sensory Capacity Attribute						
33. Near Visual Acuity	6.00	5.60	7.00	1.50	.33	2.25
34. Far Visual Acuity	2.70	2.80	3.00	1.93	.43	3.74
35. Depth Perception	1.50	2.35	.00	.27	.50	5.18
36. Color Discrimination	1.50	1.80	.00	1.85	.41	3.43
37. Auditory Acuity	6.07	5.80	6.00	1.24	.27	1.53
38. Tactual Discrimination	.83	1.90	.00	2.31	.51	5.35

Only 25 percent of the attributes under the category of *psychomotor attributes* were perceived as significant at a 3.5 level and above by respondents surveyed. The following attributes under this category were not rated as significant and included: control precision, manual dexterity, finger dexterity, arm-hand steadiness, explosive strength, static strength, dynamic strength, body equilibrium, and stamina. These results appear to be consistent with the results as reported in the pilot test.

Under the category of *sensory capacities*, only 33 percent of the attributes were perceived as significant at a 3.5 level and above by respondents surveyed. The following attributes under this category were not rated as significant and included: far visual acuity, depth perception, color discrimination, and tactual discrimination. These results appear consistent with those results reported in the pilot test with the exception of auditory acuity which was perceived as significant in the pilot test.

BUSINESS DATA PROGRAMMER

Table 11 presents the data for the occupation of business data programmer for the *Occupation-by-Attribute Instrument*. A complete profile of this instrument for the occupation of business data programmer is presented in Appendix R.

As seen in Table 11, 70 percent of the attributes under the category of *cognitive attributes* were rated by the twenty respondents surveyed as being significant at the 3.5 level and above. The following attributes were not rated as significant and

TABLE 11

STATISTICAL SCORES OF HUMAN ATTRIBUTES

Occupation: Business Data Programmer—Occupation by Attribute

Human Attributes	Median	Mean	Mode	Stand. Devia.	Stand. Error	Variance
A. Cognitive Attribute						
1. Closure	1.75	2.36	.00	2.60	.59	6.80
2. Form Perception	2.12	2.31	.00	2.18	.50	4.78
3. Perceptual Speed	4.91	4.68	5.00	1.82	.41	3.33
4. Spatial Scanning	4.80	4.10	5.00	2.23	.51	4.98
5. Spatial Orientation	1.00	1.52	.00	1.71	.39	2.93
6. Visualization	1.00	1.94	.00	2.24	.51	5.05
7. Number Facility	5.91	5.68	6.00	1.33	.30	1.78
8. Memory	4.62	4.78	4.00	1.75	.40	3.06
9. Verbal Comprehension	5.81	5.63	6.00	1.11	.25	1.24
10. Grammar	4.80	4.78	4.00	1.18	.27	1.39
11. Spelling	4.87	5.00	4.00	1.15	.26	1.33
12. Expressional Fluency	5.08	5.15	5.00	1.30	.29	1.69
13. Ideational Fluency	4.60	4.63	4.00	1.38	.31	1.91
14. Sensitivity to Problems	5.91	5.73	6.00	1.24	.28	1.53
15. Deductive Reasoning	6.70	6.36	7.00	.95	.21	.91
16. Inductive Reasoning	6.25	5.47	7.00	1.98	.45	3.93
17. Originality	4.33	4.05	5.00	1.61	.37	2.60
18. Social Intelligence	3.80	3.42	4.00	1.92	.44	3.70
19. Aesthetic Judgment	1.60	1.57	.00	1.50	.34	2.25
20. Musical Aptitude	.00	.00	.00	.00	.00	.00
B. Psychomotor Attribute						
21. Control Precision	.87	1.42	.00	1.67	.38	2.81
22. Multilimb Coordination	.23	.89	.00	1.72	.39	2.98
23. Reaction Time	.29	.89	.00	1.41	.32	1.98
24. Eye-Hand Coordination	1.20	1.68	.00	1.82	.41	3.33
25. Manual Dexterity	.45	1.10	.00	1.82	.41	3.32
26. Finger Dexterity	.87	1.52	.00	1.89	.43	3.59
27. Arm-Hand Steadiness	1.00	1.78	.00	2.04	.46	4.17
28. Explosive Strength	.05	.10	.00	.31	.07	.09
29. Static Strength	.29	.89	.00	1.37	.31	1.87
30. Dynamic Strength	.13	.36	.00	.83	.19	.69
31. Body Equilibrium	.60	1.42	.00	2.03	.46	4.14
32. Stamina	.29	.94	.00	1.54	.35	2.38
C. Sensory Capacity Attribute						
33. Near Visual Acuity	5.75	5.26	6.00	1.93	.44	3.76
34. Far Visual Acuity	1.00	1.10	.00	1.04	.24	1.09
35. Depth Perception	.36	.52	.00	.69	.16	.48
36. Color Discrimination	.36	.68	.00	1.00	.23	1.00
37. Auditory Acuity	2.00	2.15	.00	2.06	.47	4.25
38. Tactual Discrimination	.23	.47	.00	.96	.22	.93

included: closure, form perception, spatial orientation, visualization, aesthetic judgment, and musical aptitude. These result were consistent with the results of the pilot test with the following exceptions rated as non essential by the pilot test respondents (see Table 5). Those attributes included: spatial scanning, grammar, inductive reasoning, and social intelligence.

In the category of *psychomotor attributes*, no attributes were rated by these respondents as being significant. These data are consistent with those reported in the pilot test. Similarly, in the category of *sensory capacities*, only one attribute was rated as significant--near visual acuity. This rating was consistent with the pilot testing rating in Table 5.

Summary - The primary purpose for reporting the *Occupation-by-Attribute Instrument* data analysis was to construct profiles and to show the overall rating of each attribute. The purpose of the profiles is to provide a visual representation of those attributes perceived by respondents as needed and/or important for job performance regardless of the activities which comprise the total occupation. Depending upon the responsibilities within the occupation as defined by the agency and/or organization, requirements of the occupation and the significance placed on the demonstration of a particular attribute will vary. However, the method for contructing profiles across the occupation will remain the same.

Examples of the profiles for the three occupations, general secretary, automotive mechanic, and business data programmer is presented in Figures 4, 5, and 6. Individual profiles for the handicapping condition, i.e., the *Attribute-by-Exceptionality* survey results can be compared with the results of the *Occupation-by-Attribute* survey results by means of an overlay. A comparative analysis of these two is provided in another section.

Job Activity-by-Attribute Instrument Analysis

Respondents were asked to rate the importance of each attribute by job activity in each respective occupation: general secretary, automotive mechanic, and business data programmer using the same seven point scale used in the *Occupation-by-Attribute Instrument*. The purpose of this process was to determine the construction of the profiles for each job activity. In other words, a profile has been constructed for the total occupation, using the *Occupation-by-Attribute Instrument*. However, when delineations are made intra occupation vis-a-vis job activities, the need and/or importance of certain attributes may not be as rigorous.

In order to make an adequate comparison of attribute requirements within the three occupations across job activities, the data are displayed in a standard one page format. Each of the thirty-eight attributes are compared within the three occupations. The percentage of the sample surveyed who indicated whether demonstration of the attribute within a job activity is necessary and/or important to demonstrate is provided in addition to an analysis of these

Figure 4

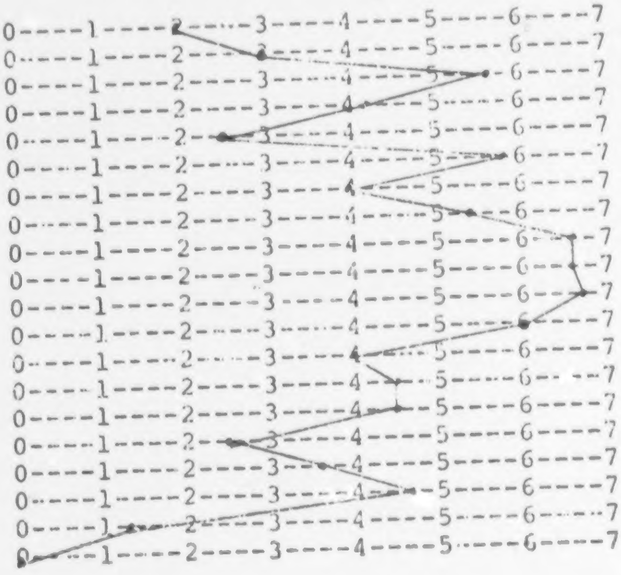
Profile of Human Attribute-by-Occupation

Occupation: General Secretary

Human Attributes — Rating Scale

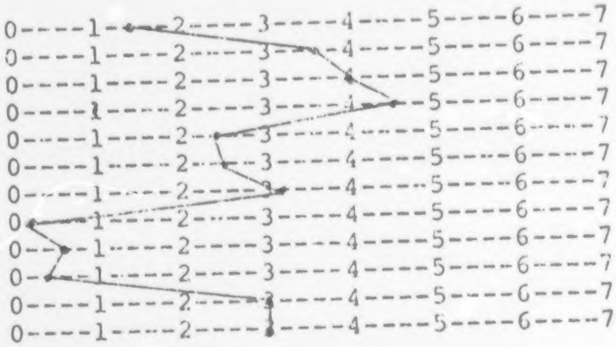
A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude



B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina



C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

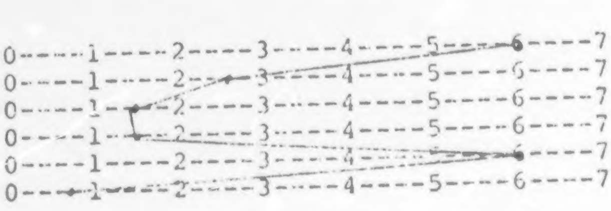


Figure 5

Profile of Human Attribute-by-Occupation

Occupation: Automotive Mechanic

Human Attributes — Rating Scale

A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-Hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

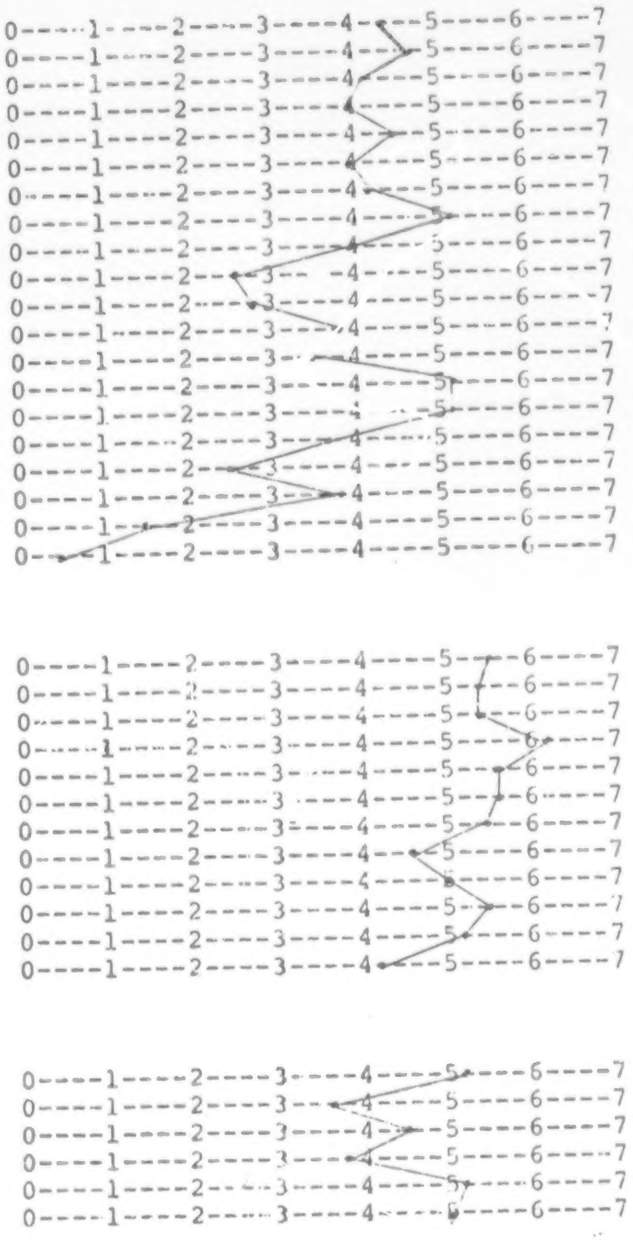
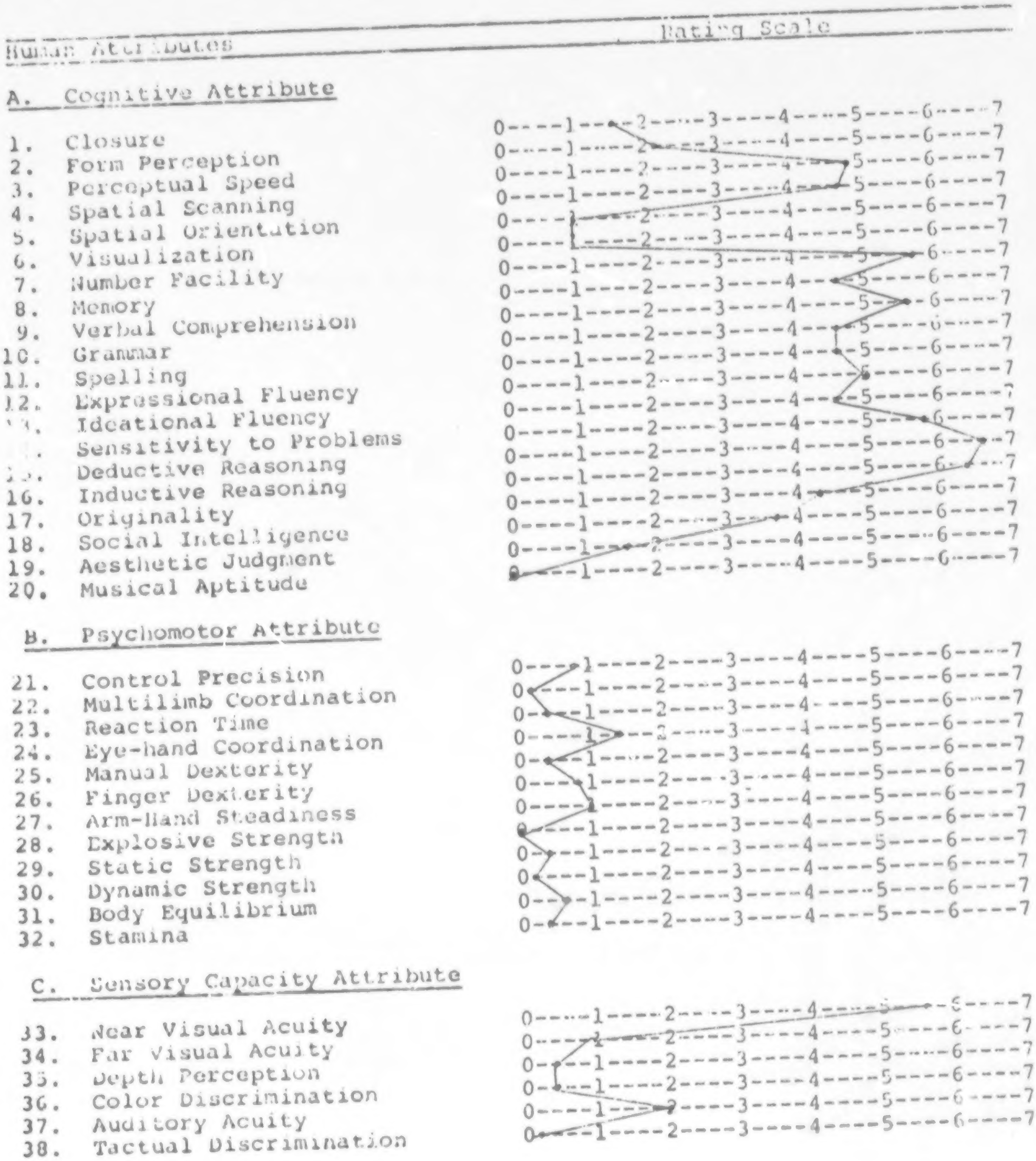


Figure 6

Profile of Human Attribute-by-Occupation

Occupation: Business Data Programmer



attributes by job activity rated as significant at the three point five level.

A comprehensive analysis, the same as provided for the *Occupation-by-Attribute Instrument*, is contained in Appendix Q for the *Job-Activity-by-Attribute Instrument* for the three occupations.

TABLE 12

COMPARATIVE ANALYSIS OF SIGNIFICANT ATTRIBUTE
ACROSS THREE OCCUPATIONS

Automotive Mechanic	General Secretary	Business Data Programmer
Cognitive Abilities		
Closure		
Form Perception		
Perceptual Speed	Perceptual Speed	Perceptual Speed
Spatial Scanning		
Spatial Orientation		
Visualization		
		Number Facility
Memory	Memory	Memory
	Verbal Comprehension	Verbal Comprehension
	Grammar	
	Spelling	Spelling
	Expressional Fluency	Expressional Fluency
		Ideational Fluency
Sensitivity to Problems	Sensitivity to Problems	Sensitivity to Problems
Deductive Reasoning		Deductive Reasoning
		Inductive Reasoning
		Originality

TABLE 12 (Continued)

COMPARATIVE ANALYSIS OF SIGNIFICANT ATTRIBUTE ACROSS THREE OCCUPATIONS

Automotive Mechanic	General Secretary	Business Data Programmer
Psychomotor Abilities		
Control Precision		
Multilimb Coordination		
Reaction Time	Reaction Time	
Eye-Hand Coordination		
Manual Dexterity		
Finger Dexterity	Finger Dexterity	
Arm-Hand Steadiness		
Explosive Strength		
Static Strength		
Dynamic Strength		
Body Equilibrium		
Stamina		
Sensory Capacities		
Near Visual Acuity	Near Visual Acuity	Near Visual Acuity
Far Visual Acuity		
Depth Perception		
	Auditory Acuity	
Tactual Discrimination		

Summary - As suggested in the analyses in Appendix S, few, if any, patterns of attribute requirements could be clearly discerned across the occupations surveyed. This would clearly suggest that separate profiles must be constructed for each occupation and separate profiles constructed for job activities within an occupation.

However, as a cursory analysis, the following comparisons across the three occupations are provided for the three categorial areas: *cognitive*, *sensory*, and *psychomotor*. Attribute demonstration for the occupation was considered significant if it was perceived by respondents as necessary and/or important in fifty percent of the job activities. This also would tend to suggest that if demonstration of the attribute was perceived as needed and/or important for certain related job activities, it also would be necessary to perform the attribute for the total occupation if the attribute was perceived as necessary and/or important in 50 percent of the job activities.

Table 17 provides a comparative summary of attributes perceived as significant for the three occupations. No attempt was made to provide a comparative commonality of attributes across occupations that were perceived by respondents as needed and/or important for job performance. Each occupation, therefore, must identify and develop profiles predicated on key attributes specific to activities included within the occupation.

CHAPTER III

HANDICAPPED SECTION

Handicap-by-Attribute Instrument Development

The next procedure utilized in relating the capabilities of the handicapped to the human attribute requirement of the jobs was development of the *Handicap-by-Attribute Instrument.* The purpose of developing the *Handicap-by-Attribute Instrument* was to ascertain whether experts in the field, i.e., those individuals who had knowledge and experience in working with persons possessing one of the nine handicapping conditions, could make judgments with respect to individual capabilities for acquiring and/or demonstrating the various attributes.

The method developed for obtaining the handicapping conditions classification involved a thorough and comprehensive review of the literature to ascertain the completeness and generalizability of the Bureau of Education for Handicapped definitions.* (A complete list of the references consulted is contained in the bibliography). The following educational groupings and definitions of handicapping conditions in Table 13 refer only to those individuals who are sufficiently impaired to be included in the handicapped population and by definition, require special education services. This taxonomy represented the area of exceptionality used in the simulation phase of this methodology.

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*Proposed taxonomy developed by consultants in cooperation with the Bureau of Education for the Handicapped in 1968 and are currently under revision.

TABLE 13

HANDICAPPING CONDITIONS: EDUCATIONAL GROUPINGS AND DEFINITIONS

Categories	Definitions
Blind - - - - - - - - - - - - - -	Children with vision so defective that sight cannot be used as a primary avenue of learning and print cannot be used as the primary mode of reading. Excluded from this group are legally blind children who are able to read large type.
Partially sighted - - - - - - - -	Children with limited but sufficient residual vision that sight can be used as a primary avenue of learning and print can be used as the primary mode of reading with the aid of special facilities, materials, and/or media. Included are legally blind children who are able to read large type.
Deaf - - - - - - - - - - - - - - -	Children whose sense of hearing, either with or without a hearing aid, is not sufficient to interpret language.

TABLE 13 (continued)

HANDICAPPING CONDITIONS: EDUCATIONAL GROUPINGS AND DEFINITIONS

Categories	Definitions
Hard-of-hearing	Children whose loss of hearing is educationally significant, but whose residual hearing is sufficient to interpret language with or without a hearing aid.
Emotionally disturbed	Children whose severe and frequent maladaptive behavior seriously reduces their attention level and learning. For educational purposes, these children are grouped according to the following degrees of severity and/or frequency of maladaptive behavior--mild, moderate, and severe.
Mentally retarded	Children whose inherent capacity to learn (cognitive limits) is so limited that they cannot meet the educational demands of the regular classroom. For educational purposes, mentally retarded children are grouped as follows:

TABLE 13 (continued)

HANDICAPPING CONDITIONS: EDUCATIONAL GROUPINGS AND DEFINITIONS

Categories	Definitions
Mentally retarded	Mildly retarded children who can acquire practical skills and functional reading and arithmetic abilities to a third-to-sixth-grade level with special education and can be guided toward social conformity.
	Moderately retarded children who can learn simple communication, elementary health and safety habits, and simple manual skills, but do not progress in functional reading or arithmetic.
	Severly retarded children who can profit from systematic habit training.
	Profoundly retarded children who may respond to skill training in use of legs, hands, and jaws.

TABLE 13 (continued)

HANDICAPPING CONDITIONS: EDUCATIONAL GROUPINGS AND DEFINITIONS

Categories	Definitions
Speech disorders	Children whose speech deviates from the average to the extent that they draw unfavorable attention to themselves, whether through unpleasant sound, inappropriateness for age level, or lack of intelligibility.
Nonsensory physical disabilities	Children with neuromuscular disabilities resulting from brain damage, characterized by disturbances of the voluntary motor functions which particularly affect the extremities, and children whose weak physical condition reduces their activity and efficiency in school work or requires special health precautions in school
Special learning disabilities	A severe disorder in one or more of the processes involved in understanding or in using spoken or written language. These include conditions which have been

TABLE 13 (Continued)

HANDICAPPING CONDITIONS: EDUCATIONAL GROUPINGS AND DEFINITIONS

Categories	Definitions
Special learning disabilities (Con't) - - - - - - - -	referred to as perceptual handicaps, brain injury, minimal brain dysfunction, and dyslexia. These do not include learning problems which are primarily due to visual, hearing, motor handicaps, mental retardation, emotional disturbance, or environmental disadvantage.

A survey instrument was devloped using the handicapping taxonomy outline in Table 13. Professional,[*] special educators with experience in the respective handicapping conditions were asked to provide information using their own judgment regarding 103 human characteristics or attributes related to a given handicapping condition.

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[*] Eight special educators selected to respond were on faculty at The Ohio State University College of Education, Department of Special Education and one faculty member was employed by the Department of Communication.

The design of the survey instrument followed the format used for the *Occupation-by-Attribute Instrument* with two noticeable exceptions. The *Handicap-by-Attribute Instrument* was designed to elicit responses with respect to handicapping condition and emphasis was placed on capabilities of handicapped individuals to demonstrate the attribute. Therefore, (1) a handicapping condition title replaced the occupation title, and (2) the rating scale was rewritten to discern whether or not an individual with a handicapping condition differed significantly from others persons who are nonhandicapped in the ability to demonstrate a particular attribute. The *Handicap-by-Attribute Instrument* is contained in Appendix T.

Results - A total of seven questionnaires were returned by faculty members knowledgeable in their respective areas of handicapping conditions. The results generally indicate that soliciting information from experts regarding persons with handicapping conditions was an unacceptable procedure to employ in this survey.

For example, only six experts were able to respond to the questionnaire in the following handicapping areas: partially sighted, emotionally disturbed, mentally retarded, blind, hard of hearing, and deaf. Comments were particularly consternating as indicated by the following excerpts.

As reported by one faculty member. . . . .

> *Partially sighted persons are not a homogeneous group. And, it should be clear that these attributes may or may not be related to the visual handicapping condition in and of itself. In many cases, these attributes may be more a function of the social treatment, environmental interaction, and expectations by significant others than to the results from the end--organ impairment or disability. Care should be taken not to perpetuate the development of such attitudes by building expectations in those who will counsel, teach, or employ persons with such impairments, disabilities, and/or handicaps. To contribute to the perpetuation of many current stereotypes concerning persons with partial sight would be detrimental and unwarranted.*

As reported by another faculty member. . . .

> *I cannot respond in good faith to this questionnaire. I appreciate the difficulties one meets with when trying to get a significant return on such an instrument, however, this rating form is antithetical to a functionally based skills training approach to the area of learning disabilities. Attempting to categorize and generalize further about individuals labeled learning disabled only makes an all too mystical field more so. I'm afraid your questionnaire assumes and seeks the mythical average LD kid. He, or she, simply does not exist.*

A complete summary analysis of the returned questionnaires is contained in Appendix U.

Summary - Based upon the results of the findings, it appears conclusively that generalized statements regarding the capabilities of individuals who are handicapped cannot be made just by experts. Reliance upon subjective judgments made by experts concerning handicapped individuals is not a method substantive enough to ascertain the capabilities of handicapped individuals. Sole reliance upon these judgments will result in irreparable harm to a handicapped individual seeking employment. Other means of obtaining individual assessment including individual self-assessment, counselor and teacher perceptions vis-a-vis working with the individual, work history, academic history, and anecdotal records will greatly enhance the probability of relating the capabilities of the handicapped to the human attribute requirements of the job.

Development of Simulations

Based upon the results of the *Handicap-by-Attribute* survey instrument, having those individuals who had knowledge and experience in working with persons having one of nine handicapping conditions make judgements with respect to individual capabilities of handicapped persons acquiring various attributes, the *Attribute-by-Exceptionality* survey instrument was developed. The purpose of developing this survey instrument was twofold. First, the plan was to have a knowledgeable vocational counselor, rehabilitation counselor, specialist, and/or other individuals who work directly in the counseling and/or placement of individuals with handicapping conditions at the secondary, post secondary, or sheltered workshop environment respond using their best judgment of their clients' ability to demonstrate thirty-eight attributes. Second, the plan was to have handicapped individuals who are students and/or clients of the vocational counselors, rehabilitation counselors, specialists, teachers, etc., respond using a self-assessment process concerning their ability to demonstrate the thirty-eight attributes.

Respondents were selected to develop a sample that would reflect various criteria:

(a) *All respondent agencies, organizations, schools, etc., represented at least one predominant area of exceptionality.*

(b) *All respondent agencies, organizations, schools, etc., had an operating system whereby at least two professionals, i.e., counselors, teachers, rehabilitation specialist, etc., had knowledge of the capabilities of the handicapped individual and worked directly with at least four handicapped individuals. In other words, the same two professionals had to have experience with the same four handicapped individuals.*

(c) *Respondent organizations were located in Columbus, Ohio.*

(d) *Respondents were willing to participate in a simulation process for approximately one and one-half hour conducted either on site or at the National Center for Research in Vocational Education.*

Recommendation for potential participating agencies were solicited from the project staff in consultation with the Project Advisory Committee. Initial contact was made with those selected agencies, organizations, and/or schools which were representatives of the nine areas of handicapping conditions. The purpose of developing a methodology to be used when relating the capabilities of the handicapped was explained to each participating agency administrator. The confidentiality of responses and anonymity of participants was assured.

The agencies, organizations, and/or schools who participated in the simulation phase of the procedures included the following:

Columbus School for the Blind

Ohio School for the Deaf

Goodwill Industries of
Greater Columbus

United Cerebral Palsey of Columbus
and Franklin County

Bureau of Services for the Blind

St. Anthony's Hospital

Department of Speech Pathology

Sixpence School

Two different survey instruments were developed for the simulation or profiling phase of this methodology--one for use by vocational counselors, rehabilitation counselors, specialists, teachers, etc.; the other for use by the handicapped individual. The two instruments were similar to the *Occupation-by-Attribute Instrument* used in the field test with the following exceptions:

(a) *"Requirements of demonstrating"* the attribute were changed to *"capable of demonstrating"* the attribute for this sample.

(b) Modification was made in the seven point rating scale to include a rating for (yes, do differ, no, do not differ) with respect to a handicapped person's ability to demonstrate a given attribute.

(c) The *Attribute-by-Exceptionality Instrument* for the handicapped sample contained only the examples of the attribute activities whereas the *Attribute-by-Exceptionality Instrument* for the professional staff contained the attribute with accompanying definition booklet.

Appendix V contains the *Attribute-by-Exceptionality Instrument* used for the two populations.

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Simulations were conducted by two Center project staff professionals in cooperation with the counseling and supervisory staff within each of the agencies representing the nine areas of exceptionality. Clients and/or students were selected by the cooperating agency. During each simulation, lasting approximately one and one-half hours, data were obtained from two professionals and four clients and/or students. Professional assessment was predicated on the person's knowledge of the handicapped individual vis-a-vis test scores, daily interaction and observation of work evaluation/work adjustment situations, and other evaluation data. The handicapped person, on the other hand, provided data vis-a-vis self-assessment. A profile of the handicapping condition was constructed from the median scores of the four clients and/or students who participated in the study. An individual profile was constructed from median scores of the two professionals and one handicapped individual assessment. The purpose of the handicapping condition profile was to provide some general indication as to--

(a) the ability of professionals to make judgments concerning the capabilities of individuals of whom they have knowledge;

(b) the ability of handicapped persons themselves to make individual self assessment; and

(c) the use of such a methodology in identifying demonstratable work relevant attributes of handicapped persons regardless of the occupation.

The data collected, although general in nature, can be profiled with any occupation, but is used in the methodology with the three occupations surveyed--general secretary, business data programmer, and automotive mechanic.

As a means of providing a description of the results, Table 14 presents a brief overview of the prevalence of the highest attribute ranking within the average median score by handicapping classification. Further, Tables 15 through 23 present the rank order of attributes by each handicapping classification based upon average median rankings. Modified median scores were obtained by taking the middle score (whole number of the three raters and taking the middle score of a set four rating). In other words, the middle score was the median across the sample for each handicapped area. It must be noted, however, that the results of the analyses are for illustrative purposes only and are in no way intended to suggest that the attributes are representative of any one handicapping population. This sample was based upon a very small sampling of handicapped individuals and was intended to validate procedures only. It was not intended to provide any type of data-based documentation of capabilities of handicapped individuals.

TABLE 14

SUMMARY RANKINGS OF ATTRIBUTE BY HANDICAPPING CLASSIFICATION

Speech Impairment	33 of the 38 attributes were rated 7
Hard of Hearing	19 of the 38 attributes were rated 7
Deaf	18 of the 38 attributes were rated 7
Blind	1 of the 38 attributes were rated 7
Mental Retardation	11 of the 38 attributes were rated 6
Non Sensory Physical	2 of the 38 attributes were rated 6
Partially Sighted	2 of the 38 attributes were rated 6
Emotionally Disturbed	11 of the 38 attributes were rated 5
Learning Disabled	1 of the 38 attributes were rated 5

TABLE 15

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

SPEECH IMPAIRED

Attributes Rated as 7

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
6. Visualization
7. Number Facility
9. Verbal Comprehension
10. Grammar
11. Spelling
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
19. Aesthetic Judgment
20. Musical Aptitude
21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-Hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina
33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

TABLE 15 Continued

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

SPEECH IMPAIRED		
Attributes Rated as 6		
5. Spatial Orientation	8. Memory	18. Social Intelligence
Attributes Rated as 5		
None		
Attributes Rated as 4		
13. Ideational Fluency		
Attributes Rated as 3		
12. Expressional Fluency		
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		

TABLE 16

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

HARD OF HEARING

Attributes Rated as 7		
5. Spatial Orientation	25. Manual Dexterity	31. Body Equilibrium
6. Visualization	26. Finger Dexterity	32. Stamina
8. Number Facility	27. Arm-Hand Steadiness	33. Near Visual Acuity
22. Multilimb Coordination	28. Explosive Strength	34. Far Visual Acuity
23. Reaction Time	29. Static Strength	35. Depth Perception
24. Eye-Hand Coordination	30. Dynamic Strength	36. Color Discrimination
Attributes Rated as 6		
1. Closure	7. Number Facility	18. Social Intelligence
2. Form Perception	11. Spelling	19. Aesthetic Judgment
3. Perceptual Speed	14. Sensitivity to Problems	38. Tactual Discrimination
4. Spatial Scanning	15. Deductive Reasoning	

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TABLE 16 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

HARD OF HEARING		
Attributes Rated as 5		
9. Verbal Comprehension	12. Expressional Fluency	16. Inductive Reasoning
10. Grammar	13. Ideational Fluency	17. Originality
Attributes Rated as 4		
37. Auditory		
Attributes Rated as 3		
None		
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		

TABLE 17

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

DEAF		
Attributes Rated as 7		
2. Form Perception	22. Multilimb Coordination	28. Explosive Strength
3. Perceptual Speed	23. Reaction Time	30. Dynamic Strength
4. Spatial Scanning	24. Eye-Hand Coordination	31. Body Equilibrium
5. Spatial Orientation	25. Manual Dexterity	32. Stamina
7. Number Facility	26. Finger Dexterity	33. Near Visual Acuity
21. Control Facility	27. Arm-Hand Steadiness	35. Depth Perception
Attributes Rated as 6		
1. Closure	8. Memory	38. Tactual Discrimination
6. Visualization	29. Static Strength	
Attributes Rated as 5		
7. Number Facility	13. Ideational Fluency	19. Aesthetic Judgment
9. Verbal Comprehension	15. Deductive Reasoning	
10. Grammar	18. Social Intelligence	

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TABLE 17 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

	DEAF	
Attributes Rated as 4		
12. Expressional Fluency	16. Inductive Reasoning	
14. Sensitivity to Problems	17. Originality	
Attributes Reated as 3		
None		
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		

TABLE 18

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

	BLIND	
Attributes Rated as 7		
37. Auditory Acuity		
Attributes Rated as 6		
38. Tactual Discrimination	20. Musical Aptitude	
Attributes Rated as 5		
1. Closure	13. Ideational Fluency	26. Finger Dexterity
2. Form Perception	15. Deductive Reasoning	27. Arm-Hand Steadiness
5. Spatial Orientation	21. Control Precision	28. Explosive Strength
6. Visualization	22. Multilimb Coordination	31. Body Equilibrium
8. Memory	25. Manual Dexterity	

TABLE 18 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

	BLIND	
Attributes Rated as 4		
3. Perceptual Speed	14. Sensitivity to Problems	19. Aesthetic Judgment
7. Number Facility	16. Inductive Reasoning	22. Multilimb Coordination
9. Verbal Comprehension	17. Originality	29. Static Strength
12. Expressional Fluency	18. Social Intelligence	30. Dynamic Strength
		32. Stamina
Attributes Rated as 3		
4. Spatial Scanning	11. Spelling	
10. Grammar	35. Depth Perception	
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		

TABLE 19

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

MENTAL RETARDATION

	Attributes Rated as 7				
	None				
	Attributes Rated as 6				
2.	Form Perception	27.	Arm-Hand Steadiness	34.	Far Visual Acuity
4.	Spatial Scanning	28.	Explosive Strength	36.	Color Discrimination
24.	Eye-Hand Coordination	31.	Body Equilibrium	37.	Auditory Acuity
26.	Finger Dexterity	33.	Near Visual Acuity		
	Attributes Rated as 5				
1.	Closure	12.	Expressional Fluency	30.	Dynamic Strength
3.	Perceptual	23.	Reaction Time	32.	Stamina
5.	Spatial Orientation	25.	Manual Dexterity	35.	Depth Perception
8.	Memory	29.	Static Strength	38.	Tactual Discrimination
	Attributes Rated as 4				
6.	Visualization	18.	Social Intelligence	21.	Control Precision
9.	Verbal Comprehension	19.	Aesthetic Judgment	22.	Multilimb Coordination
10.	Grammar	20.	Musical Aptitude		

TABLE 19 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

MENTAL RETARDATION		
Attributes Rated as 3		
7. Number Facility	14. Sensitivity to Problems	16. Deductive Reasoning
11. Spelling	15. Deductive Reasoning	17. Originality
13. Ideational Fluency		
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		

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TABLE 20

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

NON-SENSORY PHYSICAL		
Attributes Rated as 7		
None		
Attributes Rated as 6		
36. Color Discrimination	37. Auditory Acuity	
Attributes Rated as 5		
1. Closure	12. Expressional Fluency	22. Multilimb Coordination
3. Perceptual Speed	17. Originality	27. Arm-Hand Steadiness
8. Memory	21. Control Precision	38. Tactual Discrimination
9. Verbal Comprehension		
Attributes Rated as 4		
2. Form Perception	15. Deductive Reasoning	24. Eye-Hand Coordination
4. Spatial Scanning	16. Inductive Reasoning	28. Explosive Strength
10. Grammar	19. Aesthetic Judgment	33. Near Visual Acuity
11. Spelling	23. Reaction Time	35. Depth Perception
13. Ideational Fluency		

TABLE 20 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

NON-SENSORY PHYSICAL		
Attributes Rated as 3		
5. Spatial Orientation	20. Musical Aptitude	30. Dynamic Strength
7. Memory	25. Manual Dexterity	
13. Ideational Fluency	26. Finger Dexterity	
Attributes Rated as 2		
32. Stamina		
Attributes Rated as 1		
31. Body Equilibrium		
Attributes Rated as 0		
None		

TABLE 21

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

PARTIALLY SIGHTED		
Attributes Rated as 7		
None		
Attributes Rated as 6		
38. Tactual Discrimination	5. Spatial Orientation	
Attributes Rated as 5		
1. Closure	10. Grammar	28. Explosive Strength
2. Perceptual Speed	21. Control Precision	29. Static Strength
4. Spatial Scanning	22. Multilimb Coordination	30. Dynamic Strength
7. Number Facility	25. Manual Dexterity	31. Body Equilibrium
8. Memory	26. Finger Dexterity	32. Stamina
9. Verbal Comprehension	27. Arm-Hand Steadiness	37. Auditory Acuity

TABLE 21 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

PARTIALLY SIGHTED

Attributes Rated as 4

2. Form Perception
6. Visualization
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
23. Reaction Time
24. Eye-Hand Coordination
33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination

Attributes Rated as 3

20. Musical Aptitude

Attributes Rated as 2

None

Attributes Rated as 1

None

Attributes Rated as 0

None

TABLE 22

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

EMOTIONALLY DISTURBED		
Attributes Rated as 7		
None		
Attributes Rated as 6		
None		
Attributes Rated as 5		
21. Control Precision	29. Static Strength	36. Color Discrimination
24. Eye-Hand Coordination	31. Body Equilibrium	37. Auditory Acuity
26. Finger Dexterity	34. Far Visual Acuity	38. Tactual Discrimination
28. Explosive Strength	35. Depth Perception	
Attributes Rated as 4		
1. Closure	8. Memory	23. Reaction Time
2. Form Perception	11. Spelling	25. Manual Dexterity
4. Spatial Scanning	15. Deductive Reasoning	27. Arm-Hand Steadiness
5. Spatial Orientation	16. Inductive Reasoning	30. Dynamic Strength
6. Visualization	20. Musical Aptitude	32. Stamina
7. Number Facility	22. Multilimb Coordination	33. Near Visual Acuity

TABLE 22 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

EMOTIONALLY DISTURBED		
Attributes Rated as 3		
3. Perceptual Speed	12. Expressional Fluency	17. Originality
9. Verbal Comprehension	13. Ideational Fluency	18. Social Intelligence
10. Grammar	14. Sensitivity to Problems	19. Aesthetic Judgment
Attributes Rated as 2		
None		
Attributes Rated as 1		
None		
Attributes Rated as 0		
None		
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TABLE 23

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

LEARNING DISABLED

Attributes Rated as 7

None

Attributes Rated as 6

None

Attributes Rated as 5

33. Near Visual Acuity

Attributes Rated as 4

1. Closure
2. Form Perception
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
10. Grammar
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
21. Control Precision
22. Multilimb Coordination
23. Reaction Time
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina
34. Far Visual Acuity
37. Auditory Acuity
38. Tactual Discrimination

TABLE 23 CONTINUED

RANK ORDER OF ATTRIBUTES USING MEDIAN SCORES

LEARNING DISABLED CONTINUED

Attributes Rated as 3

3. Perceptual Speed
8. Memory
9. Verbal Comprehension
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
20. Musical Aptitude
24. Eye-Hand Coordination
25. Manual Dexterity
35. Depth Perception
36. Color Discrimination

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Summary - As previously mentioned, it was not the intent of this research to develop static profiles of individuals with handicapping conditions, but to develop a procedure that could be validated to relate the capabilities of the handicapped to the human attribute requirement for jobs. In order to do so, it was necessary to consider all the defined areas of exceptionality to determine the ultimate feasibility of replicating these procedures with the nine areas of handicapping conditions. The real order ratings were provided for illustration purposes only and were not intended to suggest that certain groups of handicapped persons would profile the same. Nor was the intention to suggest that similar profiles would occur if a differen population within a particular handicapped category were sampled. A complete profile of total median scores across each handicapped classification is contained in Appendix W .

The summary ranking of the attributes by handicapping classification clearly indicate marked differences in the perceptions of respondents concerning the demonstrable-behavioral performance levels of the handicapped. But, it must be reiterated that responses were gleaned for all nine areas of the handicapped, which substantiates the fact that the methodology is useable for the nine areas of the handicapped to varying degrees.

As seen in Table 15 to 23, all of the thirty-eight attributes across the nine areas of exceptionality may or may not have received the same ranking depending upon the perceptions of the individuals ranking the area of exceptionality. Each individuals area of exceptionality was rated using the same seven point scale as in the *Occupation-by-Attribute* and *Job*

Activity-by-Attribute Instruments. The one exception was that the *Attribute-by-Exceptionality* survey and rating scale were rewritten to ask what an individual was "*capable of demonstrating*" as opposed to asking "*what was required*" to demonstrate for a particular occupation or job activity, as was asked in the other two instruments.

The intent, therefore, in soliciting responses in the *Attribute-by-Exceptionality* survey from handicapped persons and those persons working with handicapped individuals was to develop profiles of attributes that the handicapped individual is capable of demonstrating. These profiles were then "*overlaid*" with those attribute profiles as provided by the respondents within the occupations. This method is discussed within the final chapter of the methodology.

CHAPTER IV

PROFILE SECTION

Profiling Techniques

As indicated by the title of this research, the ultimate outcome of all procedures was to relate the capabilities of the handicapped to the human attribute requirements of jobs. Once attribute requirements identified by individuals employed in the various occupational areas and the capability of handicapped individuals to demonstrate the thirty-eight attributes to some degree were defined, identified profiles were constructed to determine the degree to which congruency could be established in relating the two by means of a comparative *"overlay"* process. These profiles represent the median ratings of the respondents from the data analysis.

Profiles were constructed for each of the occuaptional areas--automotive mechanic, business data programmer, and general secretary. An illustration for each occupation is provided in Figures 7, 8, and 9 following. Profiling the attribute requirements vis-a-vis, the occupation only provided for a more holistic approach to perceived attribute requirements without differentiating between what specific job activities may be performed given certain occupational requirements endemic to a particular agency and/or organization.

Next, profiles were constructed for the job activities within the occupations. That is, again using the median scores from the data analysis, each job activity within the occupation--eighteen for general secretary, seventeen for automotive mechanic, and twelve for business data programmer--were constructed. Figures 7, 8, and 9 provide an example from each occupational area for illustration purposes only using the first job activity within each occupation. Appendix X contains the complete profiles for the three occupations.

Finally, again using the median scores from the data analysis for the handicapped population, profiles were constructed for each of the four handicapped individuals surveyed. In other words, each profile within the handicapped classification area represents the profile of one handicapped individual. The transparencies, Figures 10 through 19, were constructed from the profile of a handicapped individual within a respective handicapping classification and were selected at random to provide an illustration. Complete profiles for each handicapped individual within each handicapped classification are contain in Appendix Y.

In order to *relate the capabilities of the handicapped* to the requirements of jobs as defined by this research, comparisons between the requirements of the job and capabilities of the handicapped were made by means of an *overlay* process. That is, by comparing the median profile of an individual with the median profile of persons employed in the field, the level of attribute demonstration on the part of the handicapped person was discerned. Identical procedures were used for each occupational area and job activity illustrated for each handicapped person.

Figure 7

Profile of Human Attributes for Job Activities

Occupation: General Secretary

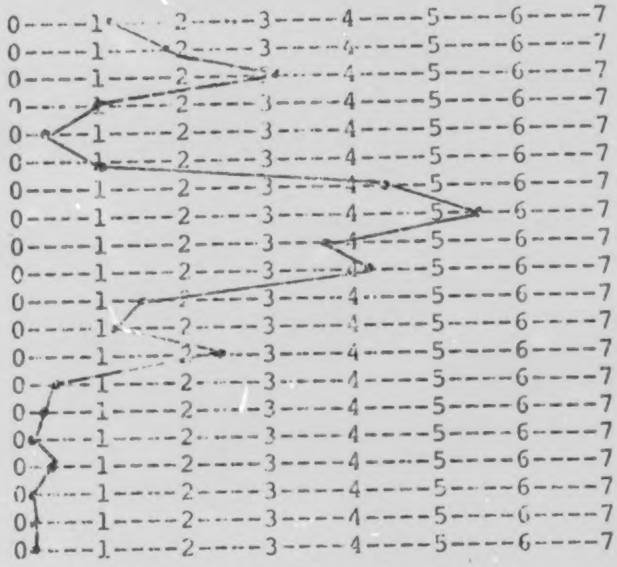
Job Activity:

Read and route incoming mail.

Human Attributes | Rating Scale

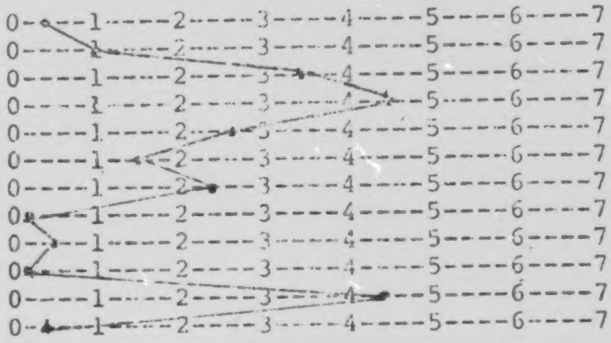
A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude



B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina



C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

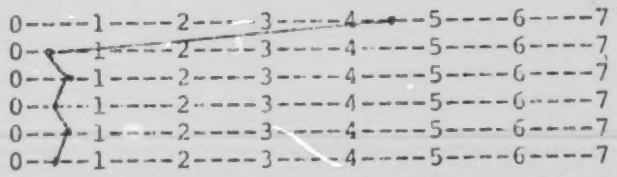


Figure 8

Profile of Human Attributes for Job Activities

Occupation: Automotive Mechanic

Job Activity:

Examine vehicle and discuss with customer or automobile-repair-service salesman, automobile tester, etc., nature and extent of damage or malfunction.

Human Attributes — Rating Scale

A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

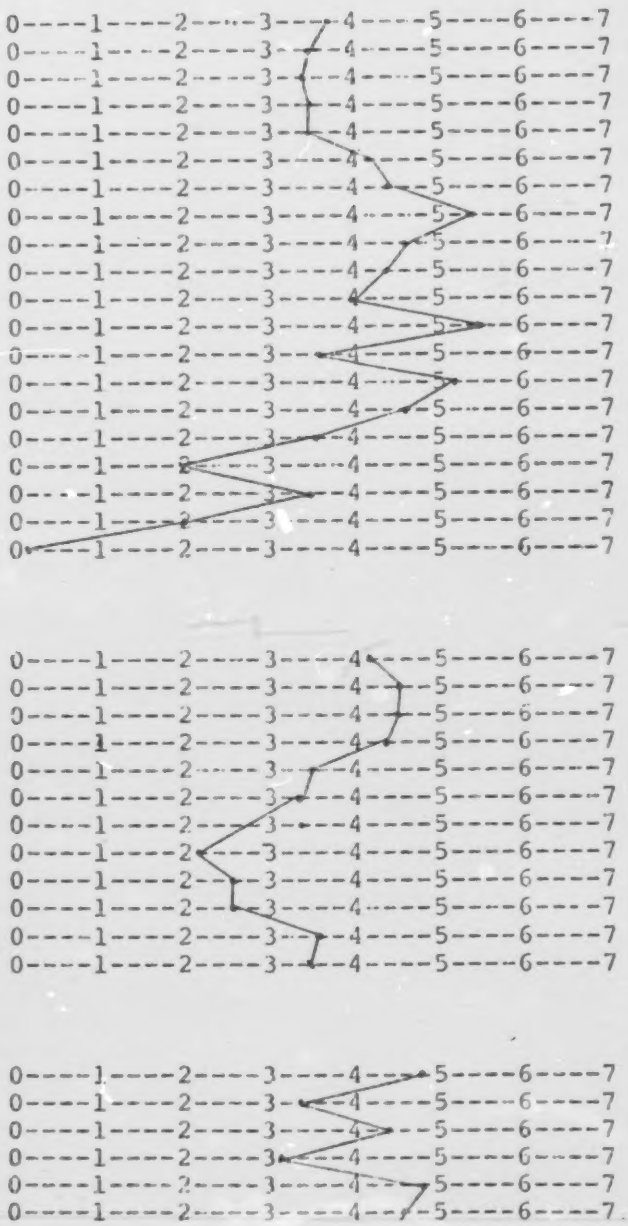


Figure 9

Profile of Human Attributes for Job Activities

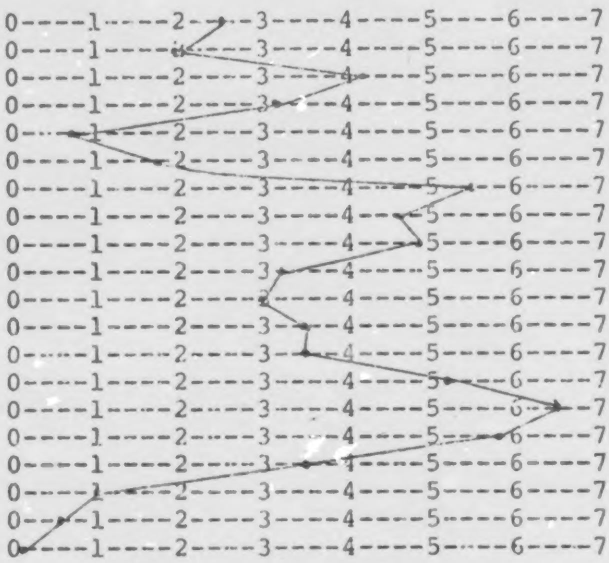
Occupation: Business Data Programmer

Job Activity:

Analyze all or part of workflow chart or diagram representing business problem by applying knowledge of computer capabilities, subject matter, algebra, and symbolic logic to develop sequence of program steps.

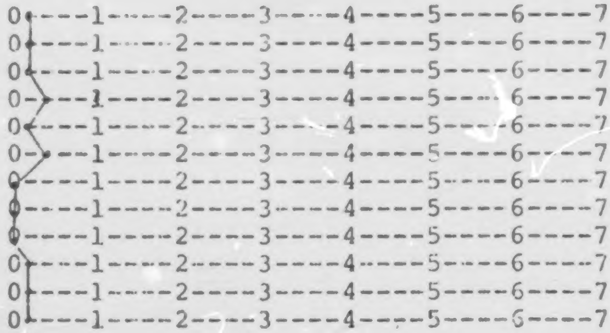
Human Attributes	Rating Scale

A. Cognitive Attribute



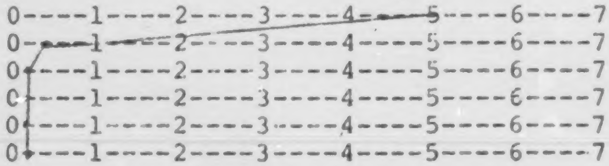
1.	Closure	0----1----2----3----4----5----6----7
2.	Form Perception	0----1----2----3----4----5----6----7
3.	Perceptual Speed	0----1----2----3----4----5----6----7
4.	Spatial Scanning	0----1----2----3----4----5----6----7
5.	Spatial Orientation	0----1----2----3----4----5----6----7
6.	Visualization	0----1----2----3----4----5----6----7
7.	Number Facility	0----1----2----3----4----5----6----7
8.	Memory	0----1----2----3----4----5----6----7
9.	Verbal Comprehension	0----1----2----3----4----5----6----7
10.	Grammar	0----1----2----3----4----5----6----7
11.	Spelling	0----1----2----3----4----5----6----7
12.	Expressional Fluency	0----1----2----3----4----5----6----7
13.	Ideational Fluency	0----1----2----3----4----5----6----7
14.	Sensitivity to Problems	0----1----2----3----4----5----6----7
15.	Deductive Reasoning	0----1----2----3----4----5----6----7
16.	Inductive Reasoning	0----1----2----3----4----5----6----7
17.	Originality	0----1----2----3----4----5----6----7
18.	Social Intelligence	0----1----2----3----4----5----6----7
19.	Aesthetic Judgment	0----1----2----3----4----5----6----7
20.	Musical Aptitude	0----1----2----3----4----5----6----7

B. Psychomotor Attribute



21.	Control Precision	0----1----2----3----4----5----6----7
22.	Multilimb Coordination	0----1----2----3----4----5----6----7
23.	Reaction Time	0----1----2----3----4----5----6----7
24.	Eye-hand Coordination	0----1----2----3----4----5----6----7
25.	Manual Dexterity	0----1----2----3----4----5----6----7
26.	Finger Dexterity	0----1----2----3----4----5----6----7
27.	Arm-Hand Steadiness	0----1----2----3----4----5----6----7
28.	Explosive Strength	0----1----2----3----4----5----6----7
29.	Static Strength	0----1----2----3----4----5----6----7
30.	Dynamic Strength	0----1----2----3----4----5----6----7
31.	Body Equilibrium	0----1----2----3----4----5----6----7
32.	Stamina	0----1----2----3----4----5----6----7

C. Sensory Capacity Attribute



33.	Near Visual Acuity	0----1----2----3----4----5----6----7
34.	Far Visual Acuity	0----1----2----3----4----5----6----7
35.	Depth Perception	0----1----2----3----4----5----6----7
36.	Color Discrimination	0----1----2----3----4----5----6----7
37.	Auditory Acuity	0----1----2----3----4----5----6----7
38.	Tactual Discrimination	0----1----2----3----4----5----6----7

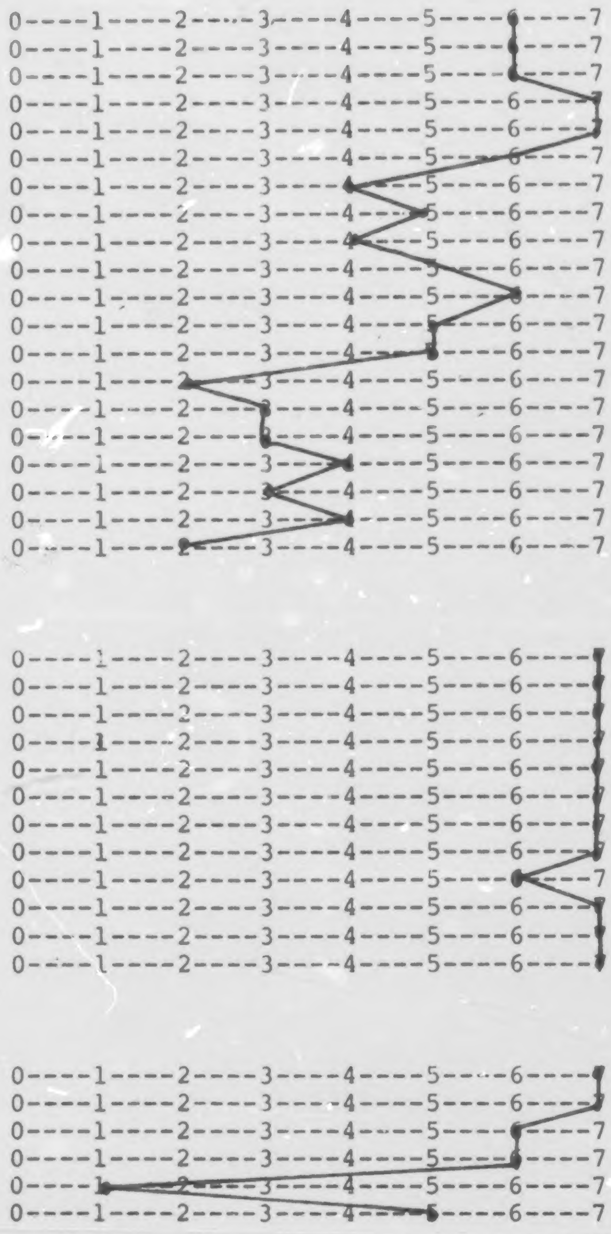
FIGURE 10

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Deaf

Human Attributes — Rating Scale



A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

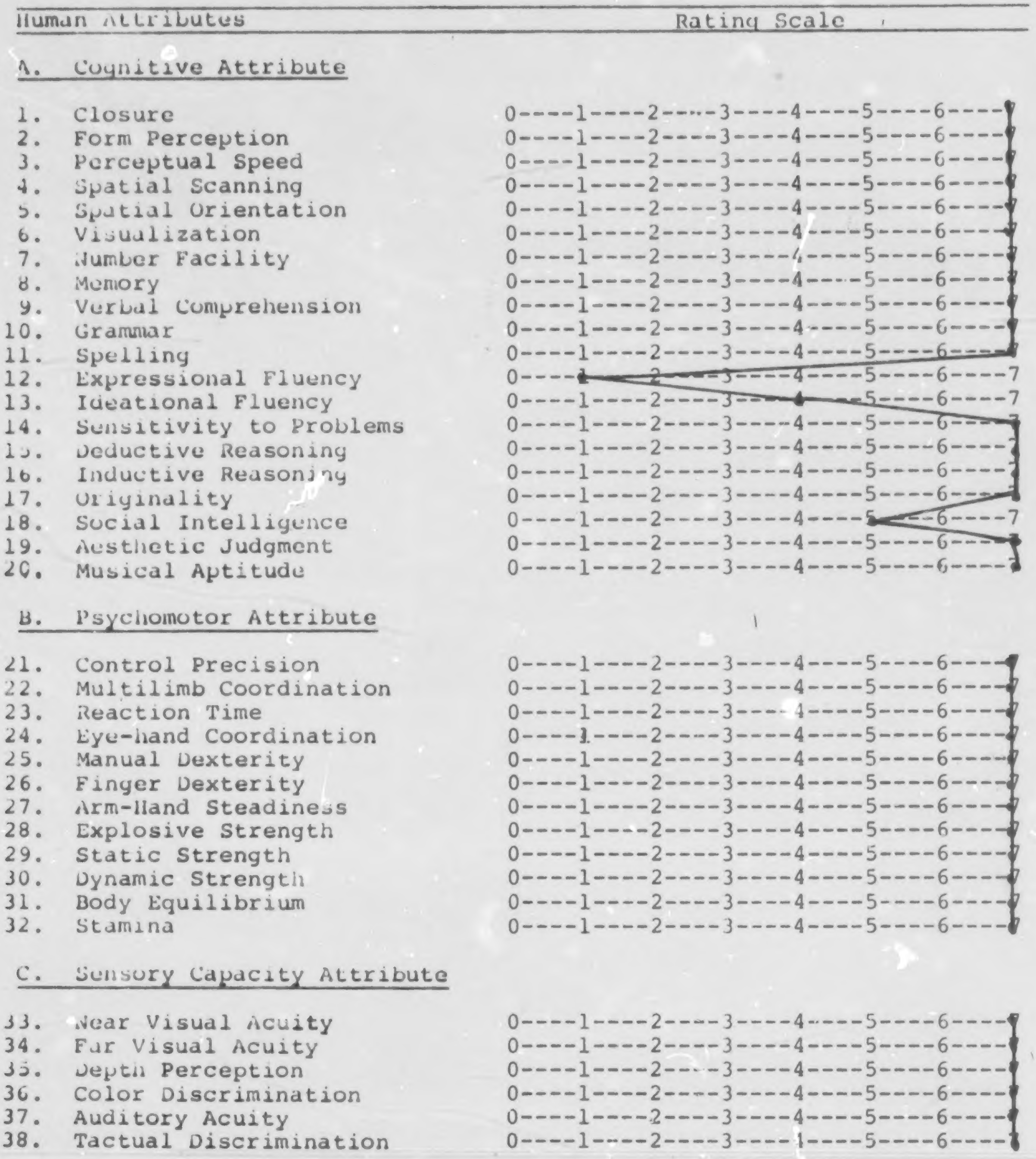
33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

FIGURE 11

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Speech Impairment



Human Attributes		Rating Scale
A. Cognitive Attribute		
1.	Closure	0----1----2----3----4----5----6----7
2.	Form Perception	0----1----2----3----4----5----6----7
3.	Perceptual Speed	0----1----2----3----4----5----6----7
4.	Spatial Scanning	0----1----2----3----4----5----6----7
5.	Spatial Orientation	0----1----2----3----4----5----6----7
6.	Visualization	0----1----2----3----4----5----6----7
7.	Number Facility	0----1----2----3----4----5----6----7
8.	Memory	0----1----2----3----4----5----6----7
9.	Verbal Comprehension	0----1----2----3----4----5----6----7
10.	Grammar	0----1----2----3----4----5----6----7
11.	Spelling	0----1----2----3----4----5----6----7
12.	Expressional Fluency	0----1----2----3----4----5----6----7
13.	Ideational Fluency	0----1----2----3----4----5----6----7
14.	Sensitivity to Problems	0----1----2----3----4----5----6----7
15.	Deductive Reasoning	0----1----2----3----4----5----6----7
16.	Inductive Reasoning	0----1----2----3----4----5----6----7
17.	Originality	0----1----2----3----4----5----6----7
18.	Social Intelligence	0----1----2----3----4----5----6----7
19.	Aesthetic Judgment	0----1----2----3----4----5----6----7
20.	Musical Aptitude	0----1----2----3----4----5----6----7
B. Psychomotor Attribute		
21.	Control Precision	0----1----2----3----4----5----6----7
22.	Multilimb Coordination	0----1----2----3----4----5----6----7
23.	Reaction Time	0----1----2----3----4----5----6----7
24.	Eye-hand Coordination	0----1----2----3----4----5----6----7
25.	Manual Dexterity	0----1----2----3----4----5----6----7
26.	Finger Dexterity	0----1----2----3----4----5----6----7
27.	Arm-Hand Steadiness	0----1----2----3----4----5----6----7
28.	Explosive Strength	0----1----2----3----4----5----6----7
29.	Static Strength	0----1----2----3----4----5----6----7
30.	Dynamic Strength	0----1----2----3----4----5----6----7
31.	Body Equilibrium	0----1----2----3----4----5----6----7
32.	Stamina	0----1----2----3----4----5----6----7
C. Sensory Capacity Attribute		
33.	Near Visual Acuity	0----1----2----3----4----5----6----7
34.	Far Visual Acuity	0----1----2----3----4----5----6----7
35.	Depth Perception	0----1----2----3----4----5----6----7
36.	Color Discrimination	0----1----2----3----4----5----6----7
37.	Auditory Acuity	0----1----2----3----4----5----6----7
38.	Tactual Discrimination	0----1----2----3----4----5----6----7

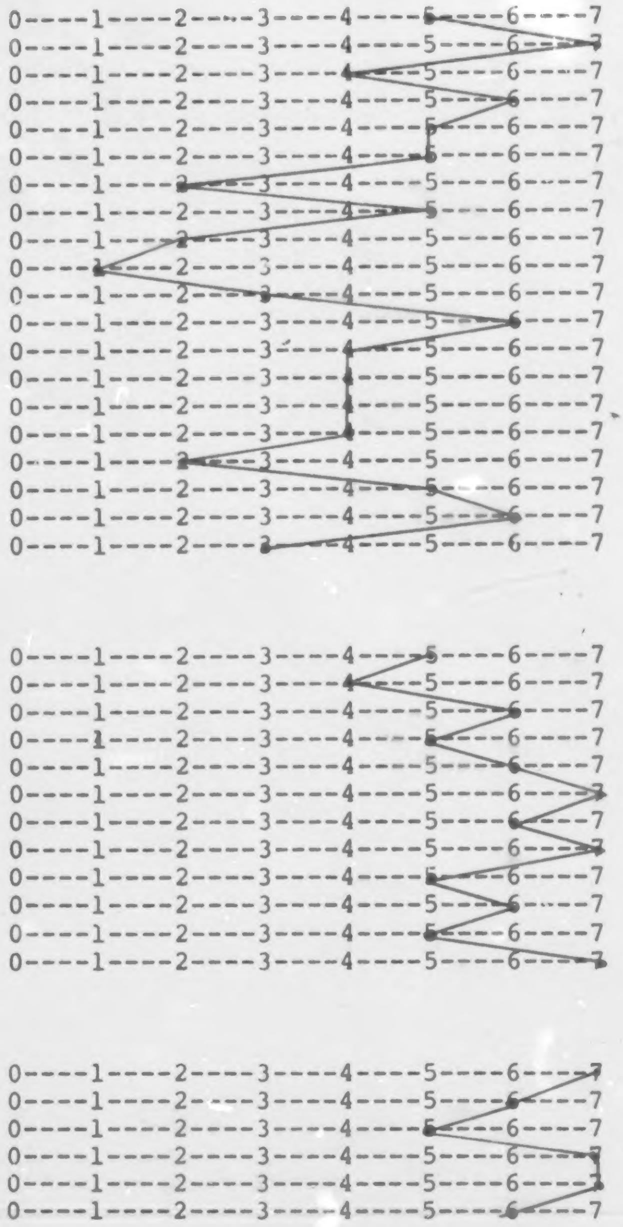
FIGURE 12

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Mentally Retarded

Human Attributes — Rating Scale



A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

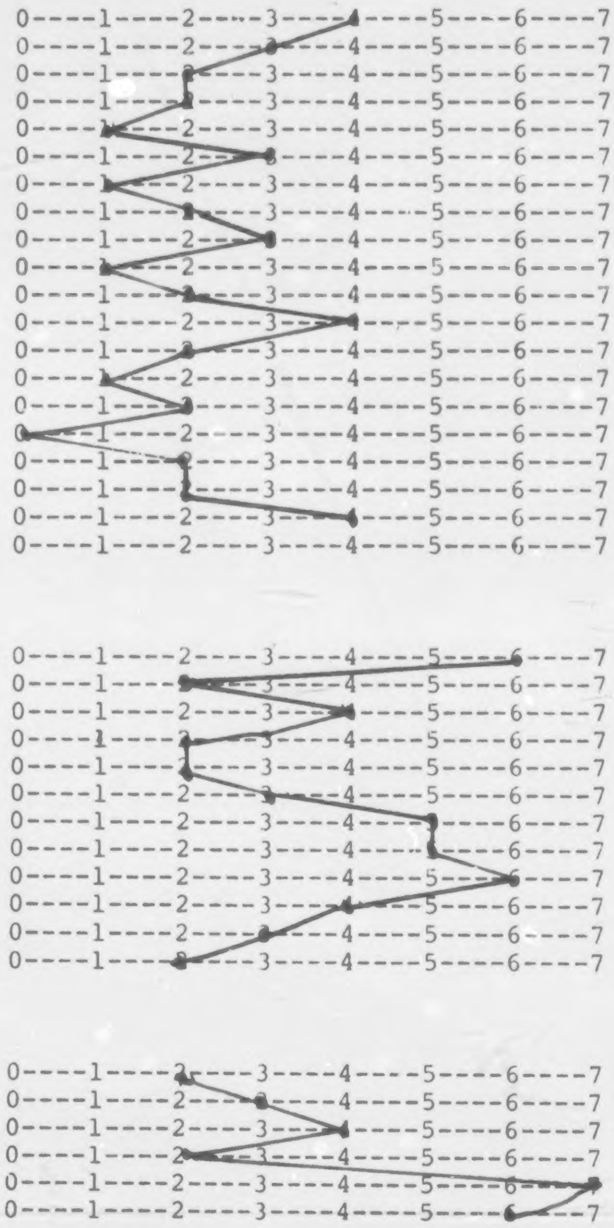
FIGURE 13

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Non Sensory Physical

Human Attributes — Rating Scale



A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

FIGURE 14

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Partially Sighted

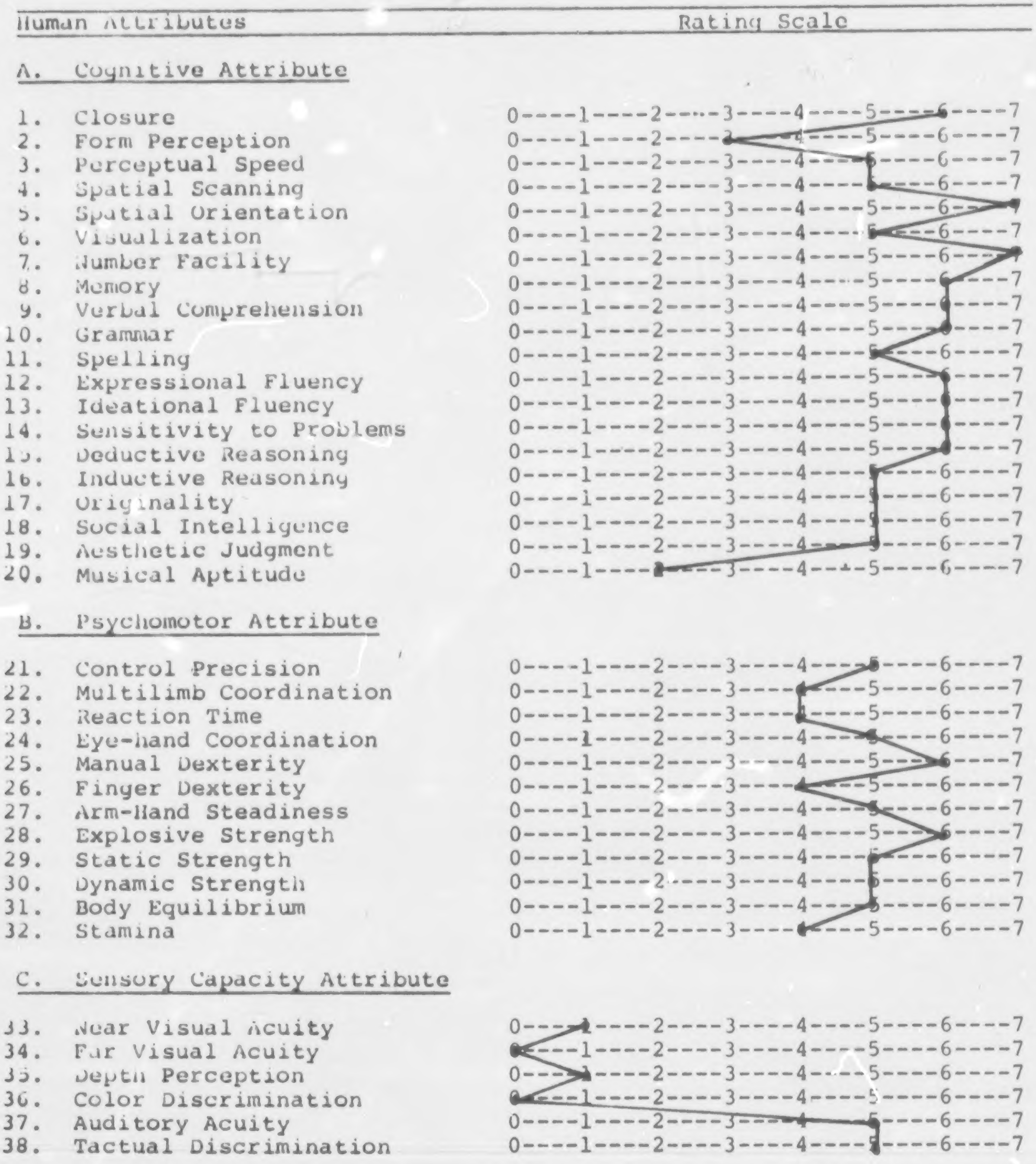


FIGURE 15

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: **Emotionally Disturbed**

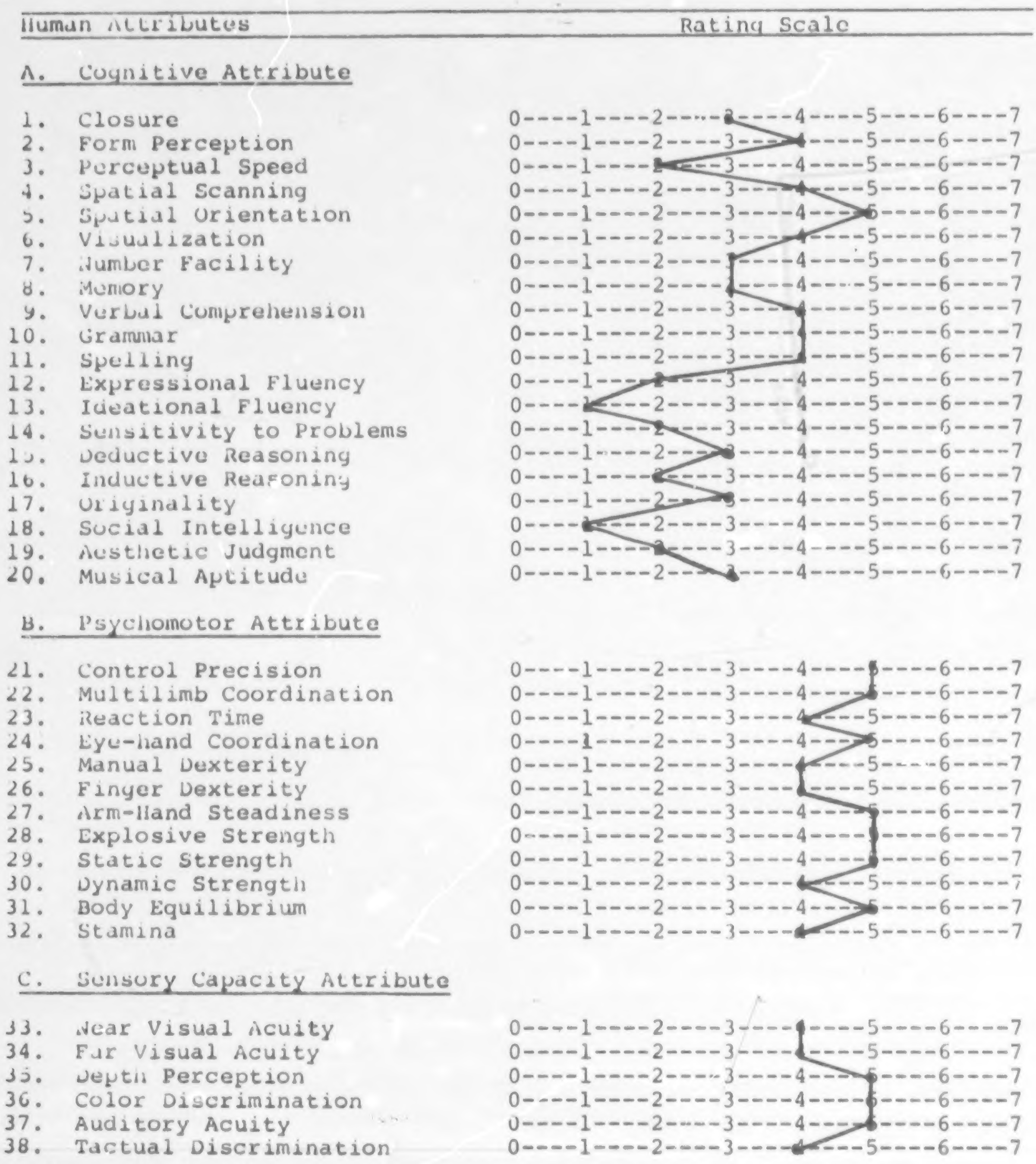
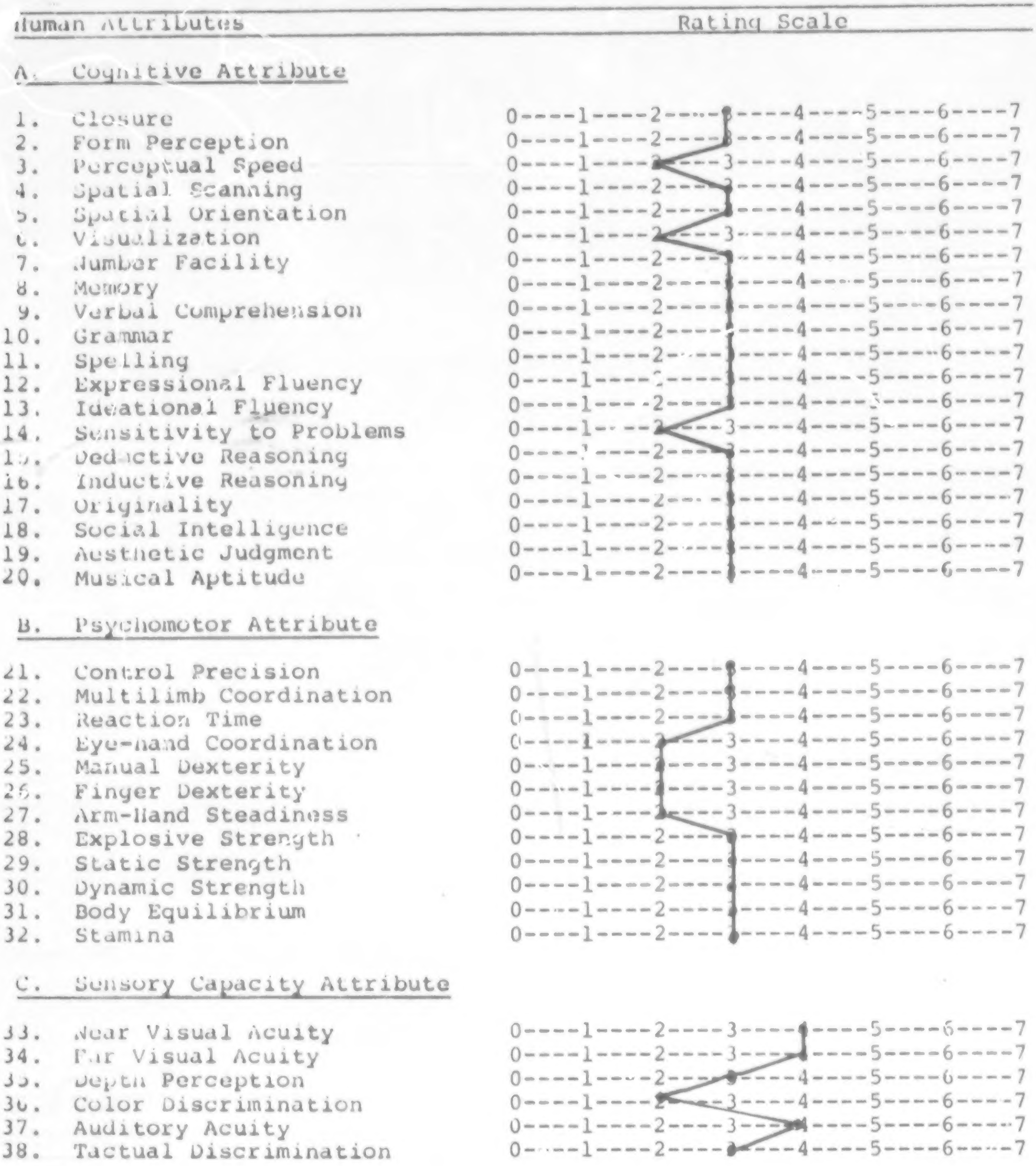


FIGURE 16

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Learning Disabled



Human Attributes	Rating Scale
A. Cognitive Attribute	
1. Closure	0----1----2----3----4----5----6----7
2. Form Perception	0----1----2----3----4----5----6----7
3. Perceptual Speed	0----1----2----3----4----5----6----7
4. Spatial Scanning	0----1----2----3----4----5----6----7
5. Spatial Orientation	0----1----2----3----4----5----6----7
6. Visualization	0----1----2----3----4----5----6----7
7. Number Facility	0----1----2----3----4----5----6----7
8. Memory	0----1----2----3----4----5----6----7
9. Verbal Comprehension	0----1----2----3----4----5----6----7
10. Grammar	0----1----2----3----4----5----6----7
11. Spelling	0----1----2----3----4----5----6----7
12. Expressional Fluency	0----1----2----3----4----5----6----7
13. Ideational Fluency	0----1----2----3----4----5----6----7
14. Sensitivity to Problems	0----1----2----3----4----5----6----7
15. Deductive Reasoning	0----1----2----3----4----5----6----7
16. Inductive Reasoning	0----1----2----3----4----5----6----7
17. Originality	0----1----2----3----4----5----6----7
18. Social Intelligence	0----1----2----3----4----5----6----7
19. Aesthetic Judgment	0----1----2----3----4----5----6----7
20. Musical Aptitude	0----1----2----3----4----5----6----7
B. Psychomotor Attribute	
21. Control Precision	0----1----2----3----4----5----6----7
22. Multilimb Coordination	0----1----2----3----4----5----6----7
23. Reaction Time	0----1----2----3----4----5----6----7
24. Eye-hand Coordination	0----1----2----3----4----5----6----7
25. Manual Dexterity	0----1----2----3----4----5----6----7
26. Finger Dexterity	0----1----2----3----4----5----6----7
27. Arm-Hand Steadiness	0----1----2----3----4----5----6----7
28. Explosive Strength	0----1----2----3----4----5----6----7
29. Static Strength	0----1----2----3----4----5----6----7
30. Dynamic Strength	0----1----2----3----4----5----6----7
31. Body Equilibrium	0----1----2----3----4----5----6----7
32. Stamina	0----1----2----3----4----5----6----7
C. Sensory Capacity Attribute	
33. Near Visual Acuity	0----1----2----3----4----5----6----7
34. Far Visual Acuity	0----1----2----3----4----5----6----7
35. Depth Perception	0----1----2----3----4----5----6----7
36. Color Discrimination	0----1----2----3----4----5----6----7
37. Auditory Acuity	0----1----2----3----4----5----6----7
38. Tactual Discrimination	0----1----2----3----4----5----6----7

FIGURE 17

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Hard of Hearing

Human Attributes — Rating Scale

A. Cognitive Attribute

1. Closure
2. Form Perception
3. Perceptual Speed
4. Spatial Scanning
5. Spatial Orientation
6. Visualization
7. Number Facility
8. Memory
9. Verbal Comprehension
10. Grammar
11. Spelling
12. Expressional Fluency
13. Ideational Fluency
14. Sensitivity to Problems
15. Deductive Reasoning
16. Inductive Reasoning
17. Originality
18. Social Intelligence
19. Aesthetic Judgment
20. Musical Aptitude

B. Psychomotor Attribute

21. Control Precision
22. Multilimb Coordination
23. Reaction Time
24. Eye-hand Coordination
25. Manual Dexterity
26. Finger Dexterity
27. Arm-Hand Steadiness
28. Explosive Strength
29. Static Strength
30. Dynamic Strength
31. Body Equilibrium
32. Stamina

C. Sensory Capacity Attribute

33. Near Visual Acuity
34. Far Visual Acuity
35. Depth Perception
36. Color Discrimination
37. Auditory Acuity
38. Tactual Discrimination

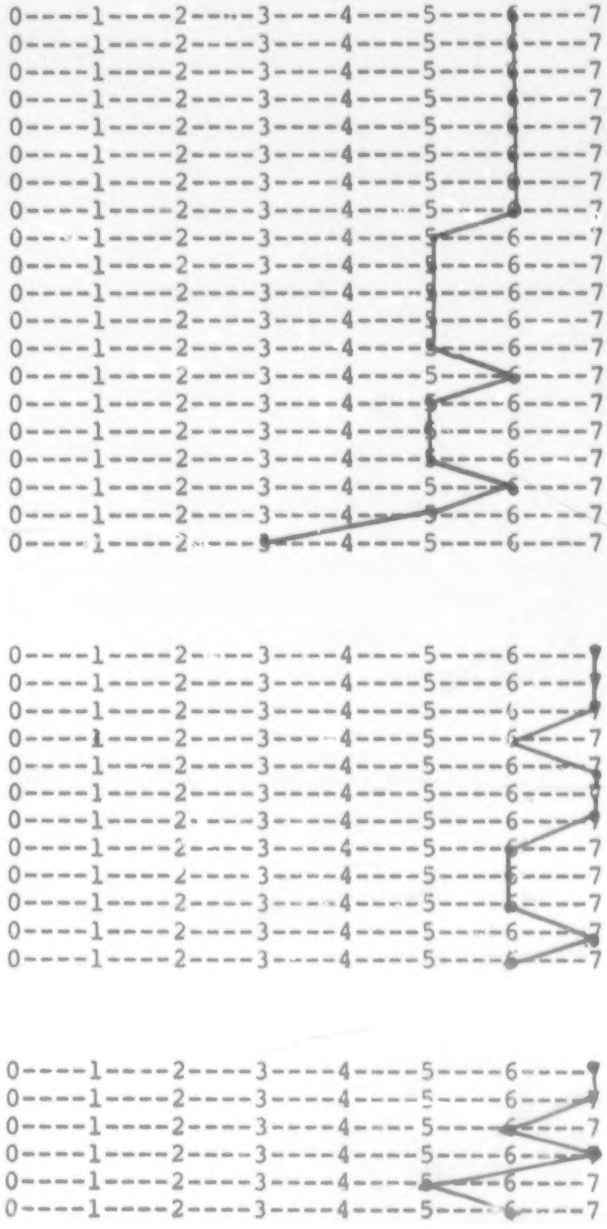
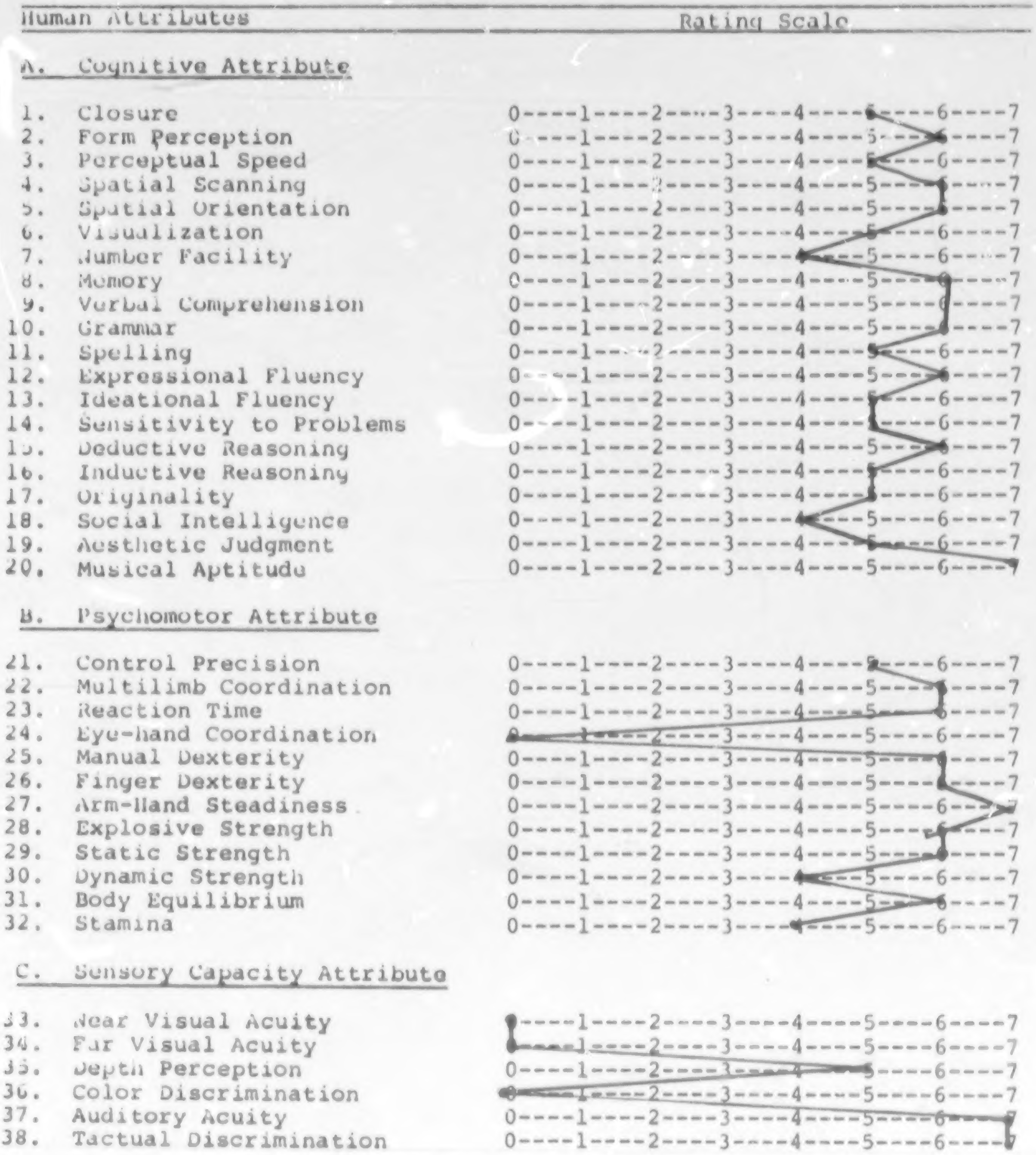


FIGURE 18

MEDIAN PROFILE OF ATTRIBUTE-BY-EXCEPTIONALITY

INDIVIDUAL RESPONDENT

Handicapping Condition: Blind



Summary - It cannot be assumed that an individual, handicapped or nonhandicapped, would be capable of demonstrating the same attributes to the same degree as a person employed within that occupation for a number of years. This is not the intent of this research. It is the intent of this research, however, to develop a methodology that can be used with any type of occupation, with job activities within the occupation, and with any type of handicapping condition. By establishing profiles of the attributes actually required by a given occupation and by matching those attributes to those demonstrated by the handicapped, counselors, educators, and those working with the job placement needs of the handicapped can begin to identify the potential of the handicapped to demonstrate a given attribute.

Caution must be exercised, however, in not equating *demonstration* or *capable of demonstrating* an attribute with *performing* a given occupation or activities within the occupation. That is, this research made no attempt to correlate demonstration of attributes by handicapped persons and specific job activities. The scope of this research was only concerned with developing a means of determining what attributes handicapped individuals were capable of demonstrating, not what occupations or job activities handicapped persons were capable of performing.

Resources for Profiling Individuals

The entire methodology and ultimate utility of profiling the handicapped on demonstrable attribute capabilities is predicated on the knowledge of the individuals working with the handicapped person. Actual observation of the handicapped individual in a real or simulated work situation is perhaps one of the best methods of rating the attributes, particularly in the *psychomotor* and *sesory capacity* attributes categories. For the sample surveyed in this research, however, persons who rated the handicapped on attribute demonstration capabilities also used anecdotal records and test data (where applicable). The use of standardized tests, however, must be used with the strictest of caution because of some of the following problems:

- *a. Inappropriateness for certain types of populations*
- *b. Standards of normalization*
- *c. Adequacy of interpretation*
- *d. Validity*
- *e. Reliability*

It is important to exercise care in selecting any type of assessment instrument and it must be remembered that test data is not an end in itself, but provides data for assessment. 283

282 No attempt is made in the following list of assessment instruments to make recommendations for the use of any one or the other tests or evaluation systems. It is provided for informa-

tional purposes only and no claims are made to any one test or stystem's ultimate merit for the handicapped population.

Following is a brief abstract of several vocational evaluation systems. A more comprehensive analysis is contained in two documents published by the Materials Development Center, Menomonie, Wisconsin.

A. McCarron - Dial Work Evaluation System
(McCarron - Dial)

This system was developed by Lawrence T. McCarron and Jack G. Dial. The target group is the mentally retarded and chronically mentally ill. The system is based on five neuropsychological factors as follows:

1. *Verbal-Cognitive - Wechseler Adult Intelligence Scale (or Stanford-Binet Intelligence Scale) and the Peabody Picture Vocabulary Test.*
2. *Sensory - Bender Visual Motor Gestalt Test and Haptic Visual Discrimination Test.*
3. *Motor Abilities -*
    a. *Fine Motor Skills Assessment: Beads-in-Box; Beads-on-Rod; Finger Tapping; Nut-and-Bolt Task; and Rod Slide.*
    b. *Gross Motor Skills Assessment: Hand Strength; Finger-Nose-Finger Movement; Jumping; Heel-Toe Tandem Walk; and Standing on one Foot.*
4. *Emotional - Observational Emotional Inventory.*
5. *Integration-Coping - San Francisco Vocational Competency Scale and Dial Behavioral Rating Scale.*

For information contact:

Commercial Marketing Enterprises
Department: MDNES
11300 North Central, Suite 105
Dallas Texas 75231

B. Philadelphia Jewish Employment and Vocational Service

Work Sample System (JEVS)

Sponsored by the U. S. Department of Labor, this system was originally designed for the desadvantaged, but is now being adapted for the disabled and is based on a system of worker trait group organization of the Dictionary of Occupational Titles as follows:

1. *Handling - Nut, Bolt and Washer Assembly; Rubber Stamping; Washer Threading; Budgette Assembly; and Sign Making.*
2. *Sorting, Inspecting, Measuring and Related Work - Tile Sorting; Nut Packing; and Collating Leather Samples.*
3. *Tending - Grommet Assembly.*
4. *Manipulating - Union Assembly; Belt Assembly; Ladder Assembly; Metal Square Fabrication; Hardware Assembly; Telephone Assembly; and Lock Assembly.*
5. *Routine Checking and Recording - Filing by Number; and Proofreading.*
6. *Classifying, Filing, and Related Work - Filing by Three Letters; Nail and Screw Sorting; Adding Machine; Payroll Computations; and Computing Postage.*
7. *Inspecting and Stock Checking - Register Reading.*
8. *Craftsmanship and Related Work - Pipe Assembly.*
9. *Costuming, Tailoring, and Dressmaking - Blouse Making and Vest Making.*

10. *Drafting and Related Work - Condensing Principle.*

For information contact:

Vocational Research Institute
Jewish Employment and Vocational Service
1913 Walnut Street
Philadelphia, Pennsylvania 19103

C. Singer Vocational Evaluation System

(Singer)

Sponsored by the Singer Education Division, this system contains twenty work samples that provide an opportunity to evaluate an individual for many job areas - mostly in the skilled trades including:

1. *Sample Making.*
2. *Bench Assembly.*
3. *Drafting.*
4. *Electrical Wiring.*
5. *Plumbing and Pipe Fitting.*
6. *Carpentry.*
7. *Refrigeration, Heating and Air Conditioning.*
8. *Soldering and WElding.*
9. *Office and Sales Clerk.*
10. *Needle Trades.*

11. *Masonry.*
12. *Sheet Metal.*
13. *Cooking and Baking.*
14. *Engine Service.*
15. *Medical Service.*
16. *Cosmetology.*
17. *Data Calculation and Recording.*
18. *Soil Testing.*
19. *Photo Laboratory Technician.*
20. *Production Machine Operating.*

For information contact:

Singer Education Division
Career Systems
80 Commercial Drive
Rochester, New York 14623

D. Talent Assessment Programs

(TAP)

The Talent Assessment Program can be described as a battery of perceptual and dexterity tests designed to measure gross and fine finger and manual dexterity, visual and tactile discrimination, and retention of details. Eleven tests are included in the system:

1. *Structural and Mechanical Visualizations.*

2. *Discrimination by Size and Shape.*
3. *Discrimination by Color.*
4. *Tactile Discrimination.*
5. *Fine Discrimination without Tools.*
6. *Gross Dexterity without Tools.*
7. *Fine Dexterity with Tools.*
8. *Gross Dexterity with Tools.*
9. *Circuital Visualization.*
10. *Retention of Structural and Mechanical Detail.*
11. *Structural and Mechanical Visualization in Greater Depth.*

For information contact:

Talent Assessment Program
7015 Colby Avenue
Des Moines, Iowa 50311

E. The Tower System
(Tower)

Developed by the Vocational Rehabilitation Administration, this system was designed for the physically and emotionally disabled and consists of a system for job analysis in fourteen areas and includes:

1. *Clerical - Business Artithmetic; Filing; Typing; One-Hand Typing; Payroll Computation; Use of Sales Book; Record Keeping; and Correct Use of English.*

2. Drafting - T Square; Triangle; Compass; Working Drawing; Drawing to Scale; and Geometric Shapes.

3. Drawing - Perspective; Forms, Shapes and Objects; Shading, Tone and Texture; Color; and Free Hand Sketching.

4. Electronics Assembly - Color Perception and Sorting; Running a Ten Wire Cable; Inspecting a Ten Wire Cable; Lacing a Cable; and Soldering Wires.

5. Jewelry Manufacturing - Use of Saw; Use of Needle Files; Electric Drill Press; Piercing and Filing Metals; Use of Pliers; Use of Torch in Soldering; and Earring and Broach Pin.

6. Leathergoods - Use of Rulers; Use of Knife; Use of Dividers; Use of Paste and Brush; Use of Scissors and Bond Folder in Pasting; Constructing Picture Frame; and Production Task.

7. Machine Shop - Reading and Transcribing Measurements; Blueprint Reading; Measuring with a Rule; Drawing to Measurement; Metal Layout and Use of Basic Tools; Drill Press Operation; Fractions and Decimals; Measuring with the Micrometer Caliper; and Mechanical Understanding.

8. Lettering - Lettering Aptitude; Alphabet and Use of T Square; Use of Pen and Ink; Use of Lettering Brush; and Brush Lettering.

9. Mail Clerk - Opening Mail; Date-Stamping Mail; Sorting Mail; Delivering Mail; Collecting Mail; Folding and Inserting; Sealing Mail; Mail Classification; Use of Scale; and Postage Calculation.

10. Optical Mechanics - Use of Metric Ruler; Use of Calipers; Lens Recognition; Lens Centering and Marking; Use of Lens Progractor; and Hand Beveling and Edging.

11. Pantograph Engraving - Introduction to the Engravograph; Setting-up, Centering Copy and Determining Specified Rations; Use of Workholder and Adjustment of Cutter; and Setting-up and Running Off a Simple Job.

12. Sewing Machine Operating - Sewing Machine Control; Use of Knee Lift and Needle Pivoting; Tracking and Sewing Curved Lines; Upper Threading; Winding and Inserting Bobbins; Sewing and Cutting; and Top Stitching.

13. *Welding - Measuring; Making a Working Drawing; Identifying Welding Rods; Use of Acetylene Torch; Use of Rods and Electrodes; Use of Torch and Rod; Measuring and Cutting Metal; and Soldering.*
14. *Workshop Assembly - Counting; Number and Color Collation; Folding and Bending; Weighing and Sorting; Counting and Packing; Washer Assembly; Inserting, Lacing and Typing; and Art Paper Banding.*

For information contact:

ICD Rehabilitation and Research Center
340 East 24th Street
New York, New York 10010

Valpar Component Work Sample Series
(Valpar)

Developed by Valpar Corporation, this system was designed for use by the industrially injured workers and uses a basic trait-and-factor approach based on task analysis and includes the following twelve work samples:

1. *Small Tools (Mechanical.*
2. *Size Discrimination.*
3. *Numerical Sorting.*
4. *Upper Extremity Range of Motion.*
5. *Clerical Comprehension and Aptitude.*
6. *Independent Problem Solving.*
7. *Multi-Level Sorting.*
8. *Simulated Assembly.*
9. *Whole Body Range of Motion.*
10. *Tri-Level Measurement.*
11. *Eye-Hand-Foot Coordination.*
12. *Soldering.*

For information contact:

Valpar Corporation
655 N. Alvernon
Suite 108
Tuscon, Arizona 85716

G. Wide Range Employment Sample Test
(WREST)

Developed by the Guidance Association of Delaware, Inc., this system was originally designed for use in a sheltered workshop dealing with the mentally retarded and physically handicapped and contains ten work samples as follows:

1. *Single, Double Folding, Pasting and Stuffing.*
2. *Stapling.*
3. *Bottle Packaging.*
4. *Rice Measuring.*
5. *Screw Assembly.*
6. *Tag Stringing.*
7. *Scratch Pasting.*
8. *Collating.*
9. *Color and Shade Matching.*
10. *Pattern Making.*

For information contact:

Guidance Associates of Delaware, Inc.
1526 Gilpin Avenue
Wilmington, Delaware 19806

H. Comprehensive Occupational Assessment and Training System (COATS)

This system, developed by Prep, Inc., was originally designed for use in manpower programs and secondary education guidance programs, but now has been slightly modified to a rehabilitation population. The COATS system consists of four components which are intended to give the evaluator/assessor a complete picture of the individual client. Each component, which may be used independently, contains three different program levels; (1) assessment and analysis, (2) prescription and instruction, and (3) evaluation and placement. The four components are as follows:

1. *Job Matching System - This component matches the person with job and training opportunities. The system is based on the degree to which workers approach or avoid 16 specific skill categories. The client uses the program to identify his/her own preferences, experiences, and capabilities.*

2. *Employability Attitudes System - In this component the client determines what his/her attitudes and behaviors are and compares them with the attitudes that employers see as being important for the hiring, promotion, or firing of an employee. Thirteen job seeking attitudes and 23 job keeping and job advancing categories are used.*

3. *Work Samples System - Presently the COATS contains ten work samples that were developed on the basis of content analysis of tasks common to job families: Drafting; Clerical-Office; Metal Construction; Sales; Wood Construction; Food Preparation; Medical Services; Travel Services; Barbering-Cosmetology; and Small Engine Repair.*

4. *Living Skills System - The component deals with what skills are needed to be functionally literate in conemporary society. The program classifies literacy into skills (reading, writing, computation, problem solving, and speaking-listening) and knowledge areas (consumer economics, occupational*

knowledge, community resources, health, and government-law).

For information contact:

Prep, Inc.
1575 Parkway Avenue
Trenton, New Jersey 08628

I. Hester Evaluation System
(Hester)

Based almost exclusively on the Dictionary of Occupational Titles, this system was developed by Goodwill Industries of Chicago and was designed for physically and mentally handicapped rehabilitation populations (except persons who are visually disabled) and is comprised of a battery of psychological tests designed to relate client scores to the DOT. Twenty-eight pure factor performance and test scores are grouped into seven categories as follows:

1. *Unilateral Motor Ability - Finger Dexterity (Purdue Pegboard), Wrist-Finger Speed (Tapping Board) and Arm-Hand Steadiness (Lafayette Motor Steadiness Kit).*
2. *Bilateral Motor Ability - Manual Dexterity (Minnesota Rate of Manipulation), Two-Arm Coordination (Two-Arm Tracing Apparatus), Two-Hand Coordination (Etch-A-Sketch with Maze Overlay), Hand-Tool Dexterity (Hand-Tool Dexterity Test), Multiple Limb Coordination (foot operated stapler), and Machine Feeding (folding machine).*
3. *Perceptual - Perceptual Accuracy (projector with slides), Perceptual Speed (Tachistoscope), and Spatial Perception (Revised Minnesota Paper Form Board Test).*
4. *Perceptual - Motor Coordination-Aiming (Lafayette Motor Steadiness Kit), Reaction Time (Multi-Stimulus Reaction Timer), Fine Perceptual Motor Coordination (Polar Pursuit Tracker), and Visual Motor Reversal (Mirror Tracing Apparatus).*

5. *Intelligence - Abstract Reasoning (Raven Progressive Matrices), Verbal Ability (SRA Verbal Test - L Scale), Numerical Ability (SRA Verbal Test - Q Scale), Decision Speed (same equipment as Perceptual Accuracy), Response Orientation (same equipment as Reaction Time), and Oral Directions (Personnel Tests for Industry - Oral Directions Test).*

6. *Achievement - Reading (Gates-McGinitie Comprehension Test) and Artithmetic (Level 1 of the Wide Range Achievement Test).*

7. *Physical Strength - Hand Strength (grip dynamometer) and Lifting Ability (standing platform).*

For information contact:

Hester Evaluation System
Goodwill Industries of Chicago
120 South Ashland Boulevard
Chicago, Illinois 60607

J. Micro-Tower

This system is aimed primarily at a general rehabilitation population, but it also can be used with the educable mentally retarded person. Developed by the ICD Rehabilitation and Research Center, the system is basically a group aptitude test that uses work sample techniques to measure seven aptitudes as defined and used in the Dictionary of Occupational Titles and contains five group work samples as follows:

1. *Motor -Electronic Connector Assembly (F-finger dexterity); Bottle Capping and Packing (M-manual dexterity); and Lamp Assembly (K-motor coordination).*

2. *Spatial - Blueprint Reading (S-spatial reasoning); and Graphics Illustration (S-spatial reasoning; K-motor coordination).*

3. *Clerical Perception - Filing (Q-clerical perception; K-motor coordination); Mail Sorting (Q-clerical perception; M-manual dexterity); Zip Coding (Q-clerical percep-*

tion; and Record Checking (Q-clerical perception).

4. *Numerical - Making Change (N-numerical reasoning); and Payroll Computation (N-numerical reasoning).*
5. *Verbal - Want Ads Comprehension (V-verbal comprehension); and Message Taking (V-verbal comprehension).*

For information contact:

Micro-Tower
ICD Rehabilitation and Research Center
340 East 24th Street
New York, New York 10010

K. Vocational Information and Evaluation Work Samples

Developed by the Philadelphia Jewish Employment and Vocational Service, the system is designed for mild, moderate, and severe mentally retarded persons. The VIEWS is based on four areas of work and six worker trait groups (WTG) in the Dictionary of Occupational Titles are organized as follows:

1. *Elemental ARea of Work - Handling WTG: Tile Sorting; Nuts, Bolts and Washers Sorting; Paper Count and Paper Cutting; Collating and Stapling; Stamping; Nuts, Bolts and Washers Assembly; and Screen Assembly. Feeding-Offbearing WTG: Match Feeding.*
2. *Clerical Area of Work - Routine Checking and Recording WTG: Mail Sort and Mail Count. Sorting, Inspecting, Measuring and Related WTG: Nut Weighing; and Valve Disassembly.*
3. *Machine Area of Work - Tending WTG: Drill Press*
4. *Crafts Area of Work - Manipulating WTG: Budgette Assembly; Valve Assembly: and Circuit Board Assembly.*

For information contact:

Vocational Research Institute
Jewish Employment and Vocational Service
1624 Locust Street
Philadelphia, Pennsylvania 19103

Finally, there are many other types of assessment instruments that can be used in making judgments concerning capabilities of the handicapped in the three areas of *cognitive, sensory* and *psychomotor* attributes and are contained in The Seventh Mental Measurement Yearbook (1972) edited by Oscar K. Buros. This yearbook and those preceding it list and describe many available tests which can be used with the handicapped. It also contains a brief statement of such things as cost, coverage, source of supply, and one or more critical reviews by individuals in the field.

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